BOEING MILITARY AIRPLANE SYSTEMS DIVISION

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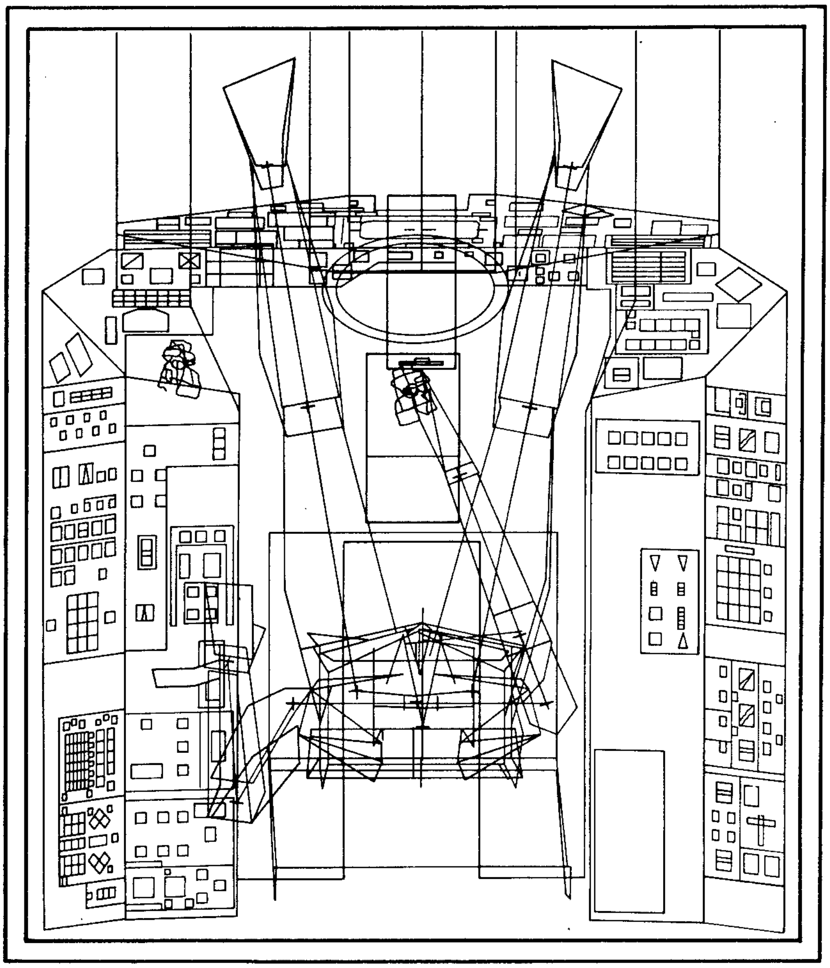

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COCKPIT GEOMETRY EVALUATION

PHASE I FINAL REPORT
VOLUME II–HUMAN DATA

JANUARY 1969

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VOLUME	DOCUMENT NUMBER	TITLE
I	D162-10125-1	PROGRAM DESCRIPTION AND SUMMARY
II	D162-10126-1	HUMAN DATA
III	D162-10127-1	COMPUTER PROGRAM
IV	D162-10128-1	MATHEMATICAL MODEL
V	D162-10129-1	VALIDATION

COCKPIT GEOMETRY EVALUATION

PHASE I

FINAL REPORT

VOLUME II–HUMAN DATA

Prepared for
Joint Army-Navy Aircraft Instrumentation Research Program

Office of Naval Research,
Department of The Navy
under
Contract N00014-68-C-0289
NR 213-065

Research Engineer, Personnel Subsystem ______________
P.W. Ryan

Project Director ______________
W.E. Springer

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FOREWORD

This report presents work which was performed under the Joint Army Navy Aircraft Instrumentation Research (JANAIR) Program, a research and exploratory development program directed by the United States Navy, Office of Naval Research. Special guidance is provided to the program for the Army Electronics Command, the Naval Air Systems Command, and the Office of Naval Research through an organization known as the JANAIR Working Group. The Working Group is currently composed of representatives from the following offices:

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Aeronautics, Code 461, Washington, D. C.
- Aircraft Instrumentation and Control Program Area

U. S. Navy, Naval Air Systems Command
Washington, D. C.
- Avionics Division; Navigation Instrumentation and Display Branch (NAVAIR 5337)
- Crew Systems Division; Cockpit/Cabin Requirements and Standards Branch (NAVAIR 5313)

U. S. Army, Army Electronics Command
Avionics Laboratory, Fort Monmouth, New Jersey
- Instrumentation Technical Area (AMSEL-VL-I)

The Joint Army Navy Aircraft Instrumentation Research Program objective is: To conduct applied research using analytical and experimental investigations for identifying, defining and validating advanced concepts which may be applied to future, improved Naval and Army aircraft instrumentation systems. This includes sensing elements, data processors, displays, controls and man/machine interfaces for fixed and rotary wing aircraft for all flight regimes.

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The findings in this report are not to be construed as an official Department of Defense or Military Department position unless so designated by other official documents.

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1.0 INTRODUCTION AND SUMMARY

A computerized dynamic man-model is being developed as part of a contract administered by the Office of Naval Research (ONR) through the auspices of the Joint Army Navy Aircraft Instrumentation Research (JANAIR) Program Working Group (Committee). The baseline man-model to be developed in the first year of the proposed six-year program is a 23-joint articulated link "stick-man" as shown in Fig. 1. The man-model specifications are given in Appendix A.

The anthropometric, joint angular, mass, and visual characteristics used for the initial man-model (BOEMAN-I) are listed in this document. Present literature has been used whenever possible to provide the dimensional, mass, angular or visual information. Whenever these data proved insufficient, assumptions were made, as stipulated herein, to derive the necessary additional information.

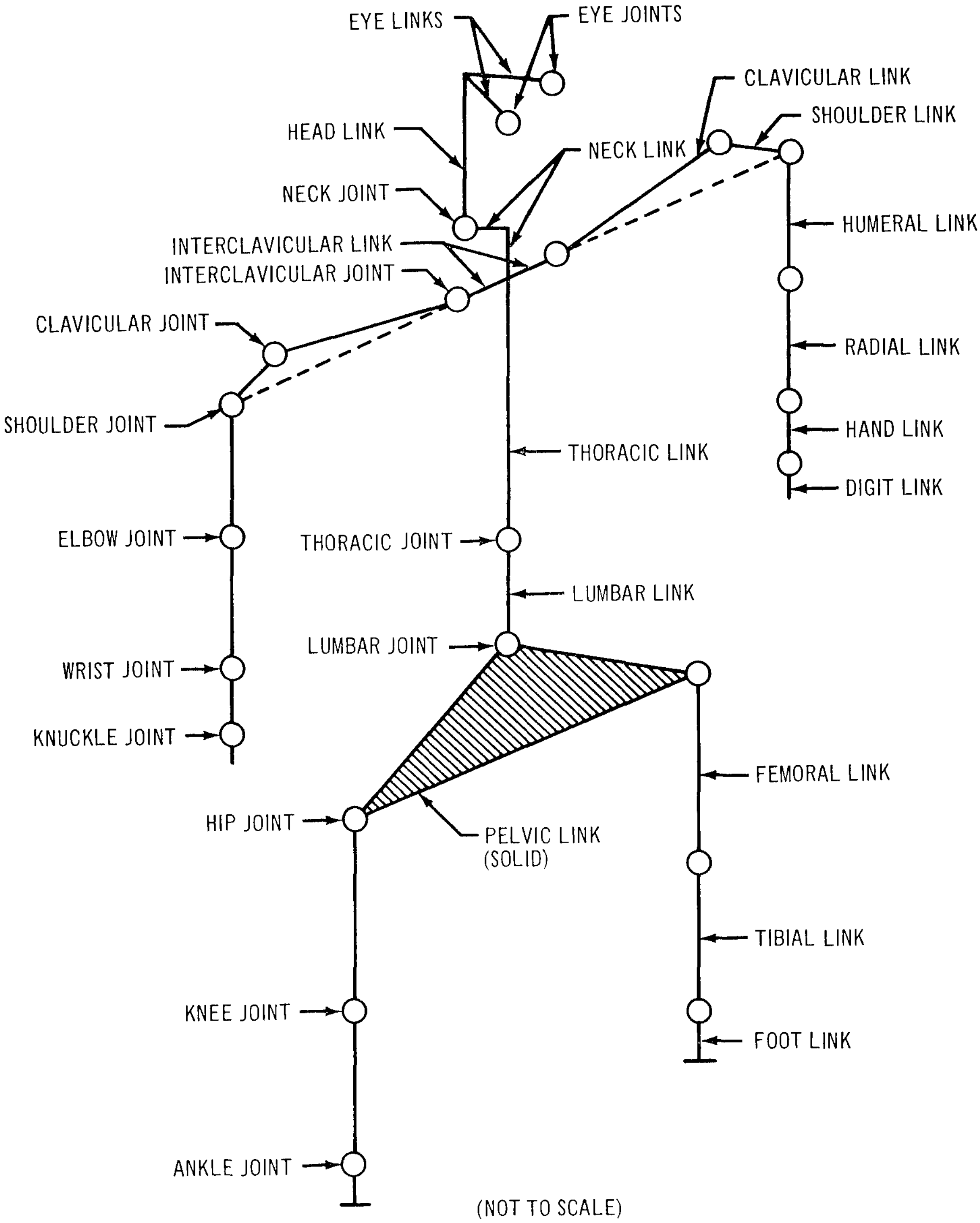


Figure 1. BOEMAN 1

2.0 GLOSSARY OF TERMS USED IN BODY MEASUREMENTS AND THE BASELINE MAN-MODEL

ACROMIAL	Pertaining to the acromion.
ACROMION	The highest point on the lateral edge of the shoulder bone.
ANKLE JOINT	Level of a line between the tip of the lateral malleolus of the fibula and a point 5 mm distal to the tibial malleolus.
ANTERIOR	The front part of the body, or segment thereof, or pertaining to the front part of the body.
AXILLARY	Referring to the armpit region.
BICEPS	The large muscle in the anterior aspect of the upper arm.
BODY INDEX	A descriptor of somatotype; the term C in $C = HW^{-1/3}$.
BROW RIDGE	The bony elevation covered by the eyebrows.
CANTHUS	A corner or angle formed by the meeting of the eyelids.
CERVICALE	The largest bony bump on the spinal column in the region of the base of the neck.
CLAVICLE	A bone joined to the breastbone and the scapula - the "collarbone".
CLAVICULAR JOINT	Midpoint of a line between the coracoid tuberosity of the clavicle (at the posterior border of the bone) and the acromioclavicular articulation (or the tubercle) at the lateral end of the clavicle; the point, however, would be visualized as on the underside of the clavicle.
CLAVICULAR LINK	The direct distance between the two joint centers listed above.
CRINION	The point in the midplane where the hairline meets the forehead.
DELTOID MUSCLE	The large muscle on the outer side of the upper arm in the shoulder region.
DIGIT LINK	The distance between the third metacarpophalangeal joint and the end of the third digit.

DISTAL END	The end of a limb farthest from the trunk, opposed to proximal.
ECTOTYPE	An ectomorphic somatotype.
ELBOW JOINT	Midpoint of a line between (1) the lowest palpable point of the medial epicondyle of the humerus, and (2) a point 8 mm above the radiale (radiohumeral junction).
ENDOTYPE	An endomorphic somatotype.
EXTERNAL	Away from the central long axis of the body; the outer portion of a body segment.
EYE JOINT	The ball and socket joint in which the eyeball moves.
EYE LINK	The distance between an eyeball and the head link (See Fig. 1).
FEMUR	The bone of the thigh.
FEMORAL LINK	The distance between the hip joint and the knee joint centers.
FOOT LINK	The distance between the ankle joint center and the sole of the foot.
FOREARM LINK	Same as the radial link.
FRANKFORT PLANE	The standard plane of orientation of the head, determined by locating the lower edges of the eye sockets and a single tragion in the same horizontal plane. This can be closely approximated when the subject looks directly forward.
GLABELLA	The most forward point in the midline of the forehead between the brow ridges.
GLUTEAL FURROW	The furrow formed by the overhang of the buttock on the back of the upper leg.
GONIAL ANGLE	The angle at the back of the lower jaw formed by the intersection of the vertical portion with the lower edge of the horizontal portion of the jaw.
HAND LINK	The distance between the wrist and the third metacarpophalangeal joint center.
HEAD LINK	Vertical distance from the neck joint center to the proximal end of the eye links.

HELIX	The rolled outer part of the ear.
HUMERAL LINK	The distance between the shoulder and elbow joint.
HUMERUS	The bone of the upper arm.
HIP JOINT CENTER	(Lateral aspect of the hip). A point at the tip of the femoral trochanter 0.4 inch anterior to the most laterally projecting part of the femoral trochanter.
INION	A small bony bump often found at the rearmost part of the head.
INTERCLAVICULAR JOINT	The joint center between the sternum and a clavicular link.
INTERCLAVICULAR LINK	The distance between the left and right interclavicular joint centers.
INTERNAL	Near the central long axis of the body; the inner portion of a body segment.
KNEE JOINT	Midpoint of a line between the centers of the posterior convexities of the femoral condyles.
KNUCKLE JOINT	The joint formed by the meeting of a finger bone (phalanx) with a palm bone (metacarpal).
LARYNX	The cartilaginous box in the throat which houses the voice mechanism. The "Adam's Apple" is the most noticeable part of the larynx.
LATERAL	Lying to the right or left side of the mid-sagittal plane of the body; opposed to medial.
LATERAL VASTUS MUSCLE	The large muscle on the outside of the upper leg running from just above the kneecap to the hip.
LEG LINK	Same as tibial link.
LINK	Ordinarily a connector between adjacent joint centers; otherwise the segment beyond a terminal joint; a member of an immovable pair (neck and thoracic links); the distance between eyeball centers and the head link.
LUMBAR JOINT	The joint postulated to be at the junction of the spine and hip.
LUMBAR LINK	Link between the lumbar and thoracic joint centers.

MALLEOLAR	Referring to the malleolus.
MALLEOLUS	A rounded bony projection in the ankle region. There is one on both the lateral and medial sides of the leg.
MANDIBLE	The lower jaw.
MASS MOMENT OF INERTIA	With respect to a given axis, it is the limit of the sum of the products of the masses of each of the elementary particles into which the entity can be conceived to be divided and the square of their distance from the given axis.
MASTOID PROCESS	The bony protrusion directly behind the ear.
MEDIAL	Lying near the midsagittal plane of the body; opposed to lateral.
MEDIAL VASTUS MUSCLE	The large muscle on the inside of the front of the upper leg running from knee cap to the hip.
MEMBRANOUS LIP	The lip of everyday language; the reddish portion of the lip.
MENTON	The lower surface of the tip of the chin in the midsagittal plane.
METACARPAL BONE	A bone of the palm of the hand.
METACARPALE	The point of juncture on the back of the hand of the palm bone (metacarpal) with the first bone of the finger (phalanx).
METATARSAL	A bone of the instep of the foot.
MIDPLANE	Same as midsagittal plane.
MIDSAGITTAL PLANE	The plane which divides the body into symmetrical right and left sections.
NASAL ROOT	The area of greatest indentation where the nose meets the forehead.
NASAL SEPTUM	The cartilaginous wall separating the right nostril from the left.
NATURAL WAIST LINE	The level of greatest lateral indentation in the abdomen region. If no Natural Waist Line is visible, the level at which the belt is worn is used instead.
NAVICULAR BONE	The small bone of the hand just distal to the bend of the wrist on the thumb side.

NECK JOINT	The joint center postulated to be between the head and neck links.
NECK LINK	Consisting of both a vertical and a horizontal component connecting the neck joint and the point where the interclavicular link crosses the thoracic link.
OCCIPITAL REGION	The back of the head.
OLECRANON	The bony tip of the elbow.
ORTHOSIS	The straightening of a deformity as by a brace.
PATELLA	The kneecap.
PELVIC LINK	The distance between hip joints (horizontal), or the distance between a line connecting the hip joints and the lumbar joint (vertical).
PHALANGEAL	Referring to a phalanx or to the phalanges.
PHALANX	(Plural, Phalanges) - A bone of the fingers or toes.
PHILTRUM	The vertical groove running from the upper membranous lip to the base of the nasal septum.
POPLITEAL AREA	The area of the back of the leg directly behind the knee.
POSTERIOR	The back of the body or referring to the back of the body.
PROSTHESIS	An artificial substitute for a missing part as a hand, arm, leg, etc.
PROXIMAL END	The end of a limb nearest the trunk; opposed to distal.
RADIAL LINK	The distance between the wrist and elbow joint centers.
RADIUS	One of the two forearm bones. This bone runs from the lateral side of the elbow region to the wrist on the same side as the thumb.
RAMUS	(Plural, Rami) - The vertical portion of the lower jaw bone (mandible).
SAGITTAL PLANE	Median vertical longitudinal plane dividing the human into right and left halves.
SCYE	The girth of the upper arm around the shoulder (acromion).

SHOULDER JOINT	A joint center between the scapula or shoulder link and the humeral link.
SHOULDER LINK	The distance between the clavicular and shoulder joint centers - an unsatisfactory measurement - approximately 3.5 cm.
SITS ERECT	Subject sits on a flat horizontal surface, his weight distributed equally, with his back held in and his shoulders held back, thighs horizontal and the knees at right angles.
SOMATOTYPE	A classification of body characteristics among endomorphy, mesomorphy, and ectomorphy.
STERNUM	The breastbone.
STYLION	The point at the center of the notch just distal to the styloid process of the radius.
SUBMANDIBULAR	Under the mandible or lower jaw.
SUBNASALE	The point where the base of the nasal septum meets the philtrum.
SUBSTERNALE	The point located at the middle of the lower edge of the breastbone.
SUPRASTERNALE	The lowest point of the notch in the upper edge of the breastbone.
TEMPLE REGION	The area on the side of the head between eye and ear.
TEMPORAL CREST	A narrow, bony ridge running along the side of the head, curving up from the upper lateral margin of the eye socket, above and past the ear, and downward, ending behind the ear. This serves as the area of attachment for the temporal muscles.
TEMPORAL MUSCLES	The muscles of the temple region.
THORACIC LINK	Link above lumbar link, in thoracic region, from the thoracic joint to the neck link.
THORACIC JOINT	A joint postulated to be located at the waist; the joint center between the lumbar and thoracic links.
TIBIAL LINK	The distance between the ankle and knee joint centers.

TRAGION	The point located at the notch just above the tragus of the ear. This point corresponds approximately to the upper edge of the ear hole.
TRAGUS	The small cartilaginous flap in front of the ear hole.
TRAPEZIUS MUSCLE	The large muscle at the back of the neck and shoulder.
ULNA	One of the two forearm bones; this bone runs from the tip of the elbow to the wrist on the same side as the little finger.
ULNAR	Referring to the ulna.
VASTUS	See lateral vastus muscle and medial vastus muscle.
WRIST JOINT	On the palmar side of the hand, the distal wrist crease at the palmaris longus tendon, or the midpoint of a line between the radial styloid and the center of the pisiform bone; on the dorsal side of the hand, the palpable groove between the lunate and capitate bones, on a line with metacarpal bone III.
ZYGOMATIC ARCH	The bony arch running along the side of the cheek almost to the ear.

3.0 DISCUSSION

3.1 GENERAL

The data necessary to describe the articulated link baseline man-model (BOFMAN-I) include: (1) link lengths, (2) joint angular limits, (3) link mass quantities and location, (4) visual capabilities, and (5) the relationships between standard anthropometric measurements and quantities required for BOFMAN-I.

The following sections include applicable data from present literature and information derived by the authors to supplement these as required.

3.1.1 Anthropometric Characteristics

Present anthropometric surveys (Refs. 1, 2, 4, 6, 25, 47, 48) serve as an initial source of dimensional data. In addition, anthropometric surveys of foreign military personnel are available (Refs. 49, 50, 51). The data of Hertzberg, et al. (Ref. 1) are used initially to synthesize reach capabilities and to determine link lengths. These reach capabilities have been determined for subjects categorized by stature and arm length.

Once the man-model is validated and a method of relating anthropometric measurements to link dimensions is developed, the use of other anthropometric surveys will be possible. This will entail the inputing of the dimensional characteristics of the new survey so that link dimensions (joint-center to joint-center distances) may be calculated.

Dempster, et al. (Ref. 54) have discussed the estimation of the radial and tibial links by measuring the corresponding bone lengths of live humans. These link dimensions can be obtained because the ends of these bones are readily palpable. The error inherent in this method is less than 2 percent. Unfortunately, the other links do not have palpable ends; hence, direct measurement using radiography is the only present technique available. The measurement techniques, the relationship between bone lengths and link lengths, and the relationship between radial and humeral links, and tibial and femoral links are also given.

Appendix B contains tables of anthropometric bivariant data. The surveys included are Hertzberg (Ref. 1), the 1967 USAF pilot population (in press), combined NATO data, and Naval Aviator data (Ref. 47). These data were furnished through the courtesy of the Anthropology Branch of AMRL, Wright-Patterson Air Force Base, Ohio, and the Air Crew Equipment Laboratory of NADC, Warminster, Pa.

3.1.1.1 Current Anthropometric Measurements

The surveys of conventional anthropometric measurements are adequately research and referenced in The Human Body in Equipment Design (Ref. 25). A reiteration of this excellent work would seem unnecessary. Selected measurements and dimensions are included in Table 1, however, to provide an immediate source of dimensional data. The corresponding pictorial descriptions are provided by Figs. 2 through 7.

3.1.2 Link Dimensions

The links of BOEMAN-I, shown in Fig. 1, are named after the bones of the human skeleton which they most closely simulate. However, a bone is a

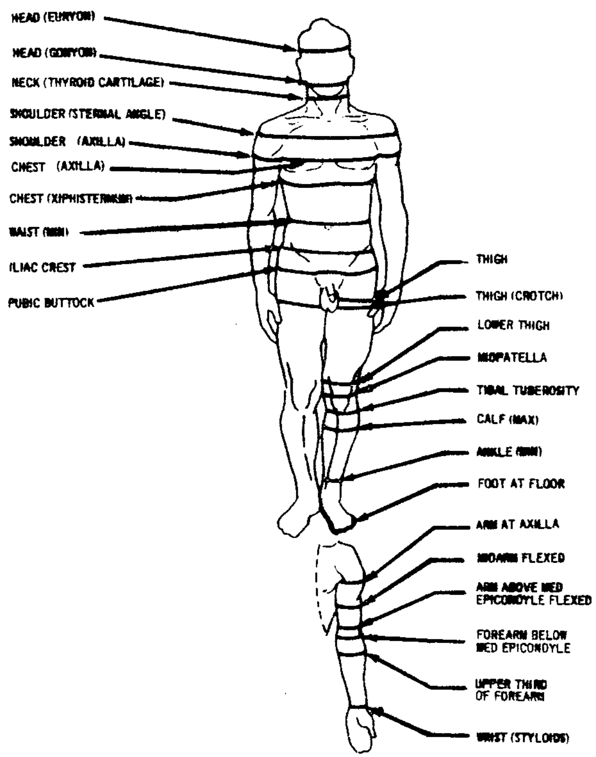
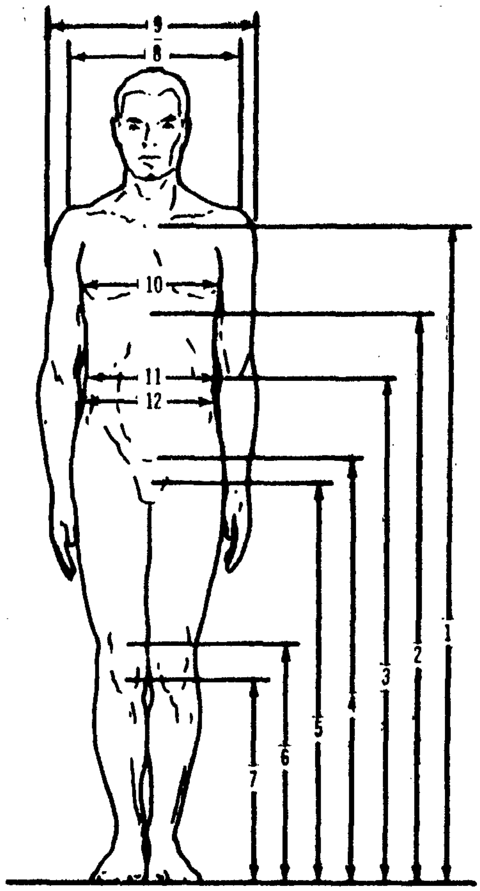


Table 1. Measurements of Girth

Circumferences (in inches)	Source	Mean	Standard Deviation	5th Percentile	95th Percentile
Head (euryon)	1	22.47	0.62	21.0	24.3
Head (gonion)	11	18.62			
Neck (thyroid cartilage)	1	14.96	0.74	13.3	16.8
Shoulder (sternal angle)	11	41.73			
Shoulder (axilla)	1	45.25	2.43	40.2	51.5
Chest (nipple level)	1	38.80	2.45	33.7	44.8
Chest (xiphisternum)	11	35.94			
Waist (Min.)	1	32.04	3.02	26.5	40.1
Iliac Crest	11	33.03			
Buttock	1	37.78	2.29	33.0	43.5
Thigh	1	22.39	1.74	18.3	26.4
Thigh (crotch)	11	22.48			
Lower Thigh	1	17.33	1.41	14.2	20.9
Mid-Patella	11	14.76			
Tibial Tuberosity	11	13.39			
Calf (max.)	1	14.40	0.96	12.2	16.7
Ankle (min.)	1	8.93	0.57	7.8	10.5
Foot at Floor	11	24.49			

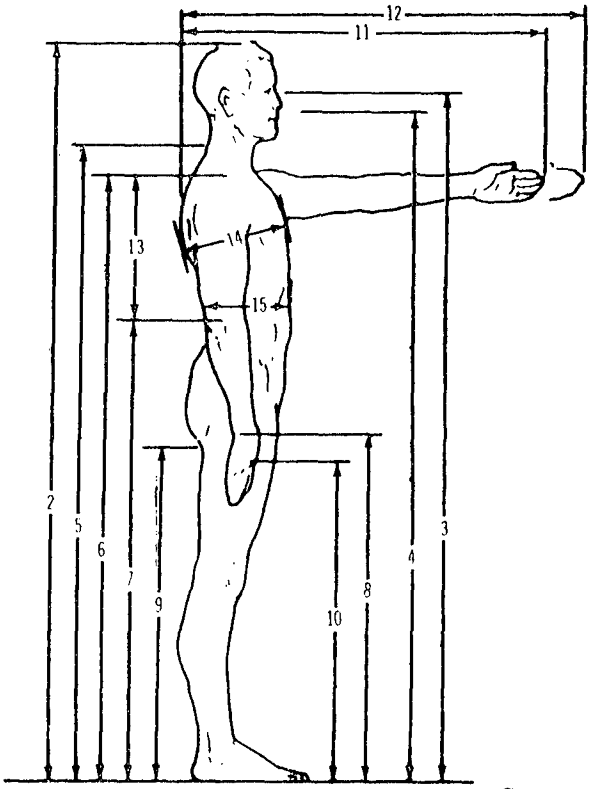
Table 1. Measurements of Girth (Cont)

Circumferences (in inches)	Source	Mean	Standard Deviation	5th Percentile	95th Percentile
Arm at Axilla	1	12.54	1.10	10.2	15.2
Mid-arm Flexed	1	12.79	1.07	10.5	15.4
Arm Above Med. Epicondyle Flexed	1	11.50	0.73	9.9	13.3
Forearm Below Med. Epicondyle	11	11.15			
Upper Third of Forearm	11	10.63			
Wrist (styloids)	1	6.85	0.40	6.0	7.8



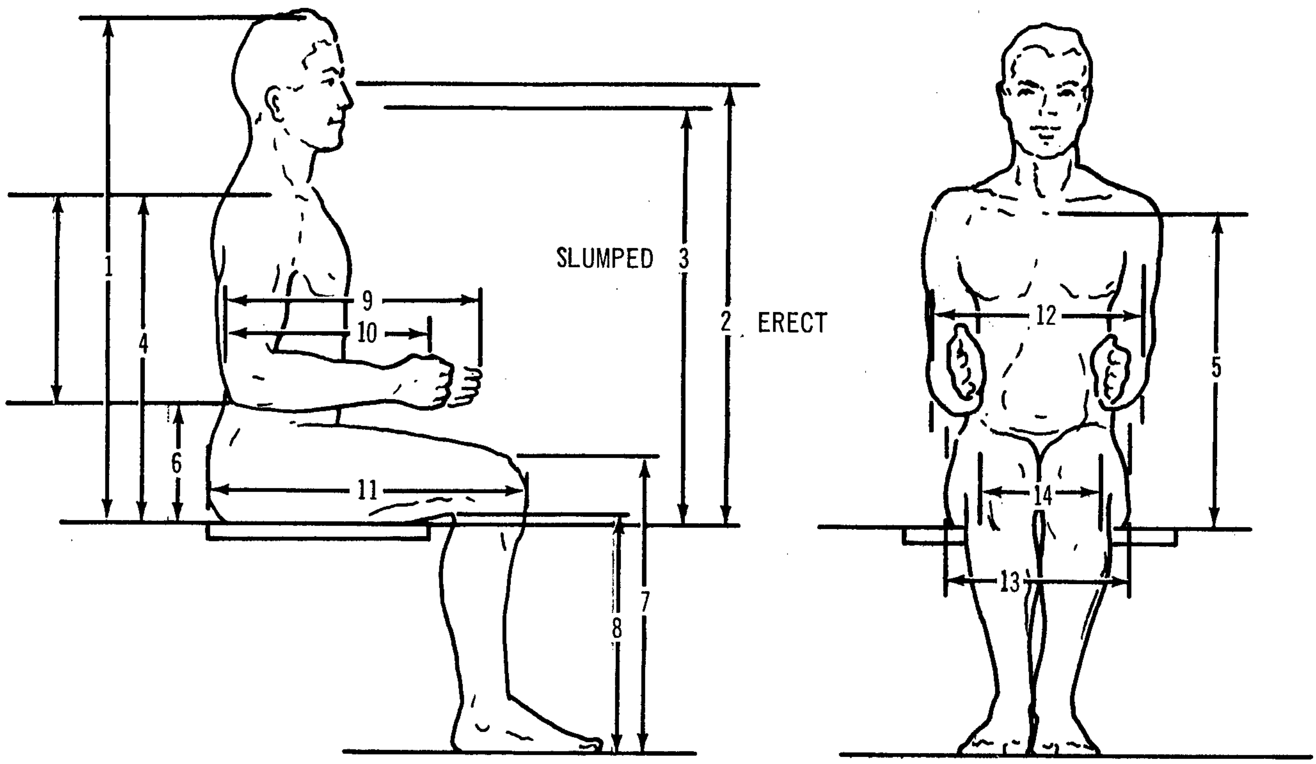
No.	Dimensions (in.)	Source	Mean	Standard Deviation	5th Percentile	95th Percentile
1	Top of Breastbone (Suprasternale) Height	1	56.28	2.19	52.7	59.9
2	Bottom of Breastbone (Substernale) Height	1	48.71	2.02	45.6	52.1
3	Waist Height	1	42.02	1.81	39.1	45.0
4	Upper Junction of Penis and Abdomen	1	34.52	1.75	31.6	37.4
5	Crotch (In-seam) Height	1	32.83	1.73	30.4	35.7
6	Top Edge of Kneecap Height	1	20.22	1.03	18.4	21.9
7	Knee Joint Height (Lower Leg Length)	2	17.94	1.12	16.1	19.8
8	Shoulder bone Breadth (Bi-acromion)	1	15.75	.74	14.6	16.9
9	Maximum Shoulder Breadth (Bi-Deltoid)	1	17.88	.91	16.5	19.4
10	Chest Breadth	1	12.03	.80	10.8	13.4
11	Waist Breadth	1	10.66	.94	9.4	12.3
12	Pelvis Width (Bi-iliac)	4	11.40	.62	10.4	12.4

Figure 2. STANDARD NUDE STANDING DIMENSIONS



No.	Dimensions (in.)	Source	Mean	Standard Deviation	5th Percentile	95th Percentile
1	Weight (Nude) in Lbs.	1	163.66	20.86	132.5	200.8
2	Stature	1	69.11	2.44	65.2	73.1
3	Eye Height at Attention	1	64.69	2.38	60.8	68.6
4	Eye Height Relaxed (Based upon 1.2" normal slump)	3	63.48	?	?	?
5	Base of Neck (Cervicale) Height	1	59.08	2.31	55.3	62.9
6	Top of Shoulder (Acromion) Height	1	56.50	2.28	52.8	60.2
7	Elbow (Radiale) Height	1	43.50	1.77	40.6	46.4
8	Wrist (Stylion) Height	1	33.52	1.52	31.0	36.1
9	Buttock Crease (Gluteal Furrow) Height	1	31.57	1.62	29.0	34.3
10	Knuckle (Metacarpal III) Height	1	30.04	1.45	27.7	32.4
11	Fingertip to Back (Shoulders Back)	1	34.59	1.65	31.9	37.3
12	Fingertip to Back (Shoulders Forward)	1	38.59	1.90	35.4	41.7
13	Top of Shoulder to Elbow	2	14.28	.81	12.9	15.6
14	Chest Depth	1	9.06	.75	8.0	10.4
15	Waist Depth	1	7.94	.88	6.7	9.5

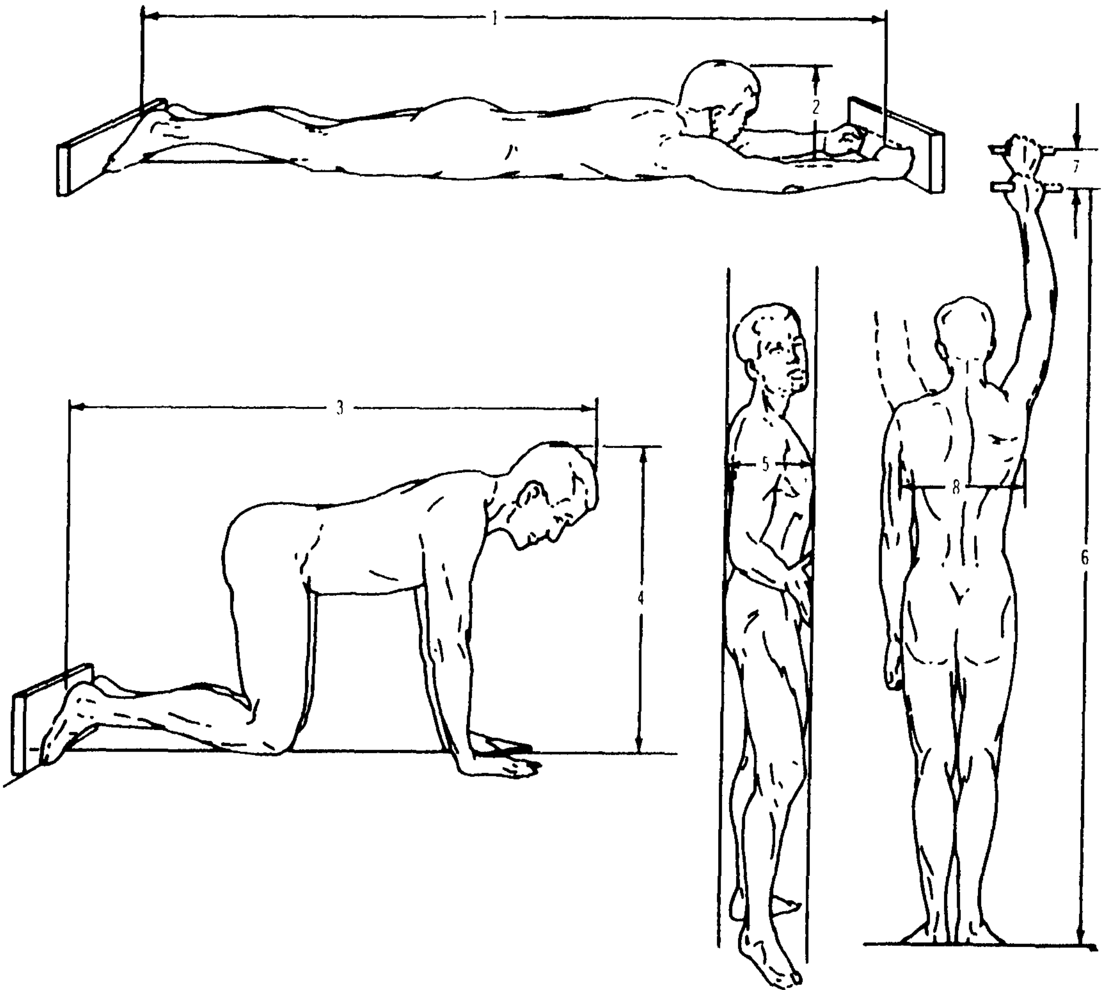
Figure 2. STANDARD NUDE STANDING DIMENSIONS (Cont)



No.	Dimension (in.)	Source	Mean	Standard Deviation	5th Percentile	95th Percentile
0	Elbow to Shoulder	1	14.32	0.69	13.2	15.4
1	Sitting Height	1	35.94	1.29	33.8	38.0
2	Eye Height, Erect	1	31.47	1.27	29.4	33.5
3	Eye Height, Relaxed Slump	3*	29.47			
4	Top of Shoulder (Acromion) Height	1	23.26	1.14	21.3	25.1
5	Top of Sternum Height (Trunk Height)	2	23.01	1.17	21.1	24.9
6	Elbow Height	1	9.12	1.04	7.4	10.8
7	Top of Knee	1	21.67	.99	20.1	23.3
8	Back of Knee (Popliteus) Height	1	16.97	.77	15.7	18.2
9	Elbow to Finger Tips	1	18.86	.81	17.6	20.2
10	Elbow to Center of Grip	4	14.2	.79	13.0	15.5
11	Buttocks to Front of Knee	1	23.62	1.06	21.9	25.4
12	Outside of Elbows Breadth	1	17.28	1.42	15.2	19.8
13	Hip Breadth	1	13.97	.87	12.7	15.4
14	Outside of Knees Breadth	1	7.93	.52	7.2	8.8

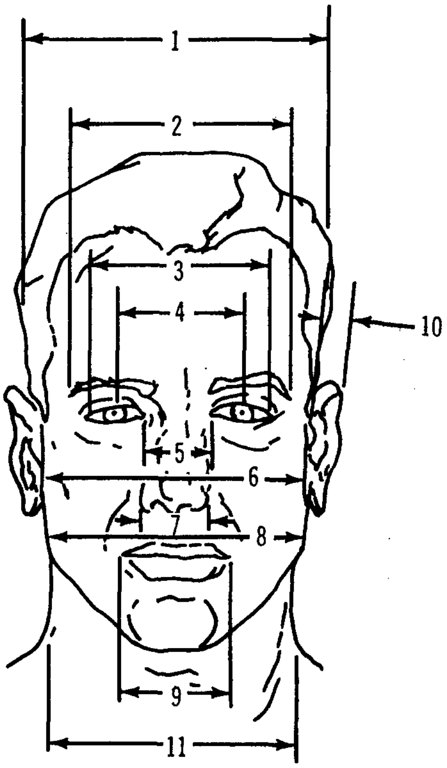
*Based on an average slump of 2.0" estimated by Ely et.al. (3).

Figure 3. STANDARD NUDE SITTING DIMENSIONS



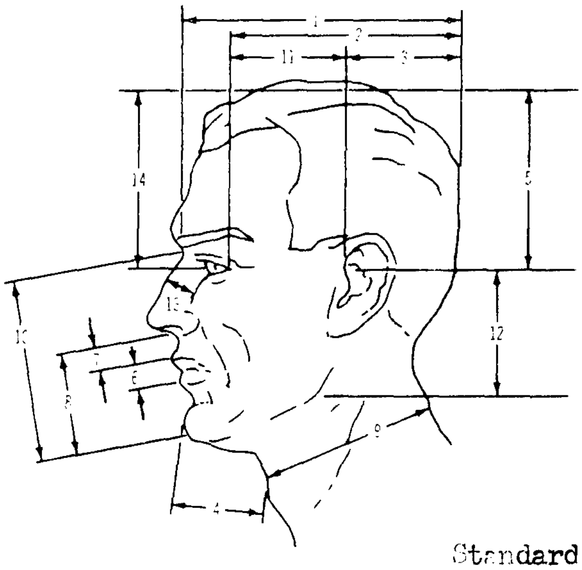
No.	Dimension (in.)	Source	Mean	Standard Deviation	5th Percentile	95th Percentile
1	Knuckle to Toe Length, Prone	9	90.12	3.41	84.7	95.8
2	Head Clearance, Prone	9	14.46	1.28	12.3	16.4
3	Head to Toe Length, Hands and Knees	9	53.15	2.61	49.3	58.2
4	Head to Floor, Hands and Knees	9	28.43	1.30	26.2	30.5
5	Squeeze-through Space (i.e., Chest Depth), Standing	1	9.06	.75	8.0	10.4
6	Overhead Grasp, "Flatfooted"	9	82.54	3.33	76.8	88.5
7	Tiptoe Increment to Overhead Grasp Wearing Shoes	10	3.1	1.2	1.1	5.1
8	Chest Width, Both Arms Overhead	4	14.3	.67	13.3	15.5

Figure 4. NUDE DIMENSIONS FOR SIMULATED WORKING POSTURES



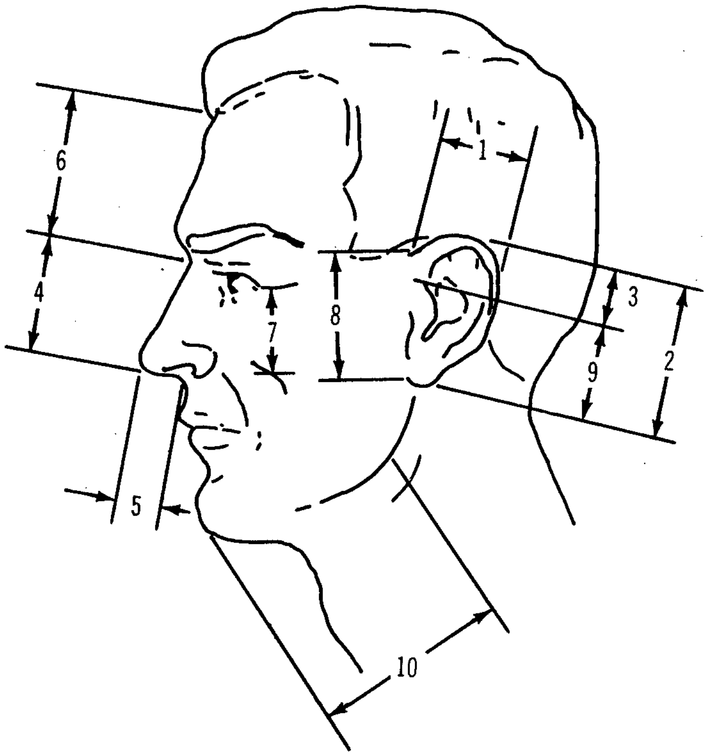
No.	Dimension (In.)	Source	Mean	Deviation	Percentile	Percentile
1	Head Breadth	1	6.07	.20	5.74	6.40
2	Maximum Brow (Frontal) Diameter	1	4.71	.20	4.39	5.05
3	Outside Eye Corners (Biocular) Diameter	1	3.78	.17	3.48	4.06
4	Interpupillary Distance	1	2.49	.14	2.27	2.74
5	Inside Eye Corner (inter-ocular) Diameter	1	1.25	.10	1.09	1.42
6	Earhole-Earhole (Bitragion) Diameter	1	5.60	.21	5.3	5.9
7	Nose Breadth	1	1.31	.11	1.16	1.49
8	Maximum Jaw Width (Bigonial Diameter)	1	4.27	.22	3.9	4.6
9	Lip Length	1	2.03	.14	1.81	2.27
10	Ear Protrusion	1	.84	.14	.63	1.10
11	Neck Width	5	4.83	.27	4.38	5.27

Figure 5. STANDARD HEAD AND NECK DIMENSIONS



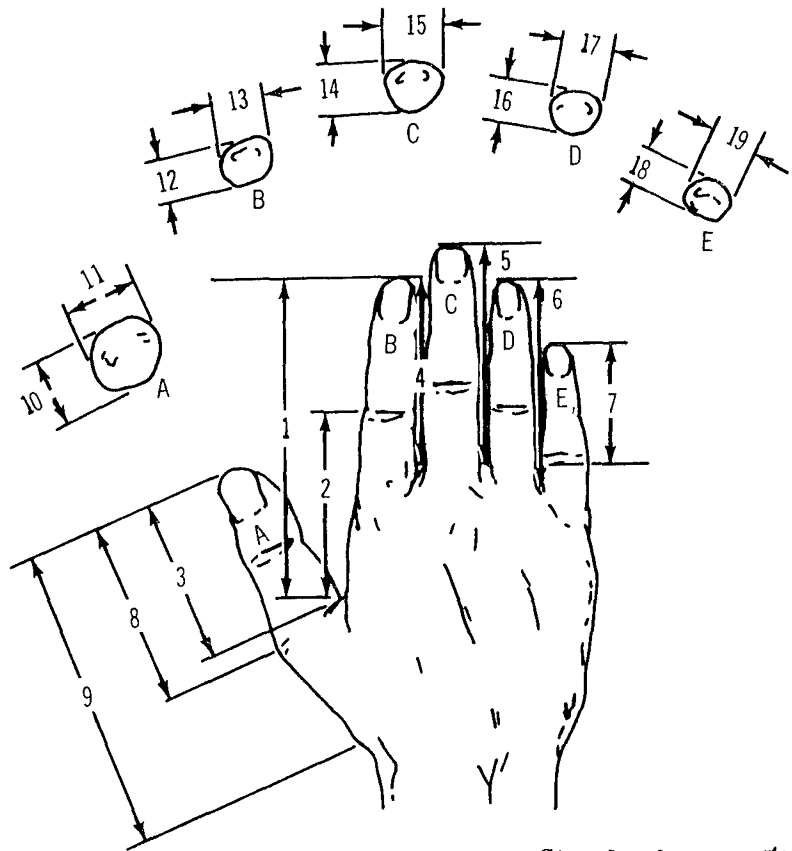
No.	Dimension (in.)	Source	Mean	Standard Deviation	5th Percentile	95th Percentile
1	Nasal Root to Back of Head (With Back of Head Against a Wall)	1	7.75	.34	7.2	8.3
2	Outside Eye Corner (External Canthus) to Back of Head (With Head Against a Wall)	1	6.78	.32	6.2	7.3
3	Ear Hole (Tragion) to Back of Head (With Head Against a Wall)	1	4.03	.30	3.5	4.5
4	Chin (Menton) Projection	1	1.88	.26	1.5	2.3
5	Earhole to Top of Head (Tragion to Vertex: Head Height)	1	5.11	.30	4.6	5.6
6	Lip Margin to Lip Margin	1	.64	.12	.44	.83
7	Upper Lip (Philtrum) Length	1	.77	.14	.54	.98
8	Bottom of Nose (Subnasale) to Chin (Menton)	1	2.63	.27	2.19	3.07
9	Neck Depth	5	4.87	.34	4.31	5.43
10	Top of Nose (Nasion) to Point of Chin (Menton)	5	4.88	.26	4.45	5.31
11	Earhole (≈ Tragion) to Outside Corner (External Canthus) of Eye	5	3.25	.15	3.00	3.50
12	Earhole (Tragion) to Jaw Angle (Gonion)	5	2.89	.23	2.51	3.27
13	Top of Nose (Nasion) to Inside Corner of Eye	5	.93	.08	.80	1.06
14	Eye Pupil to Top of Head	4	4.4	.30	3.9	5.1

Figure 5. STANDARD HEAD AND NECK DIMENSIONS (Cont)



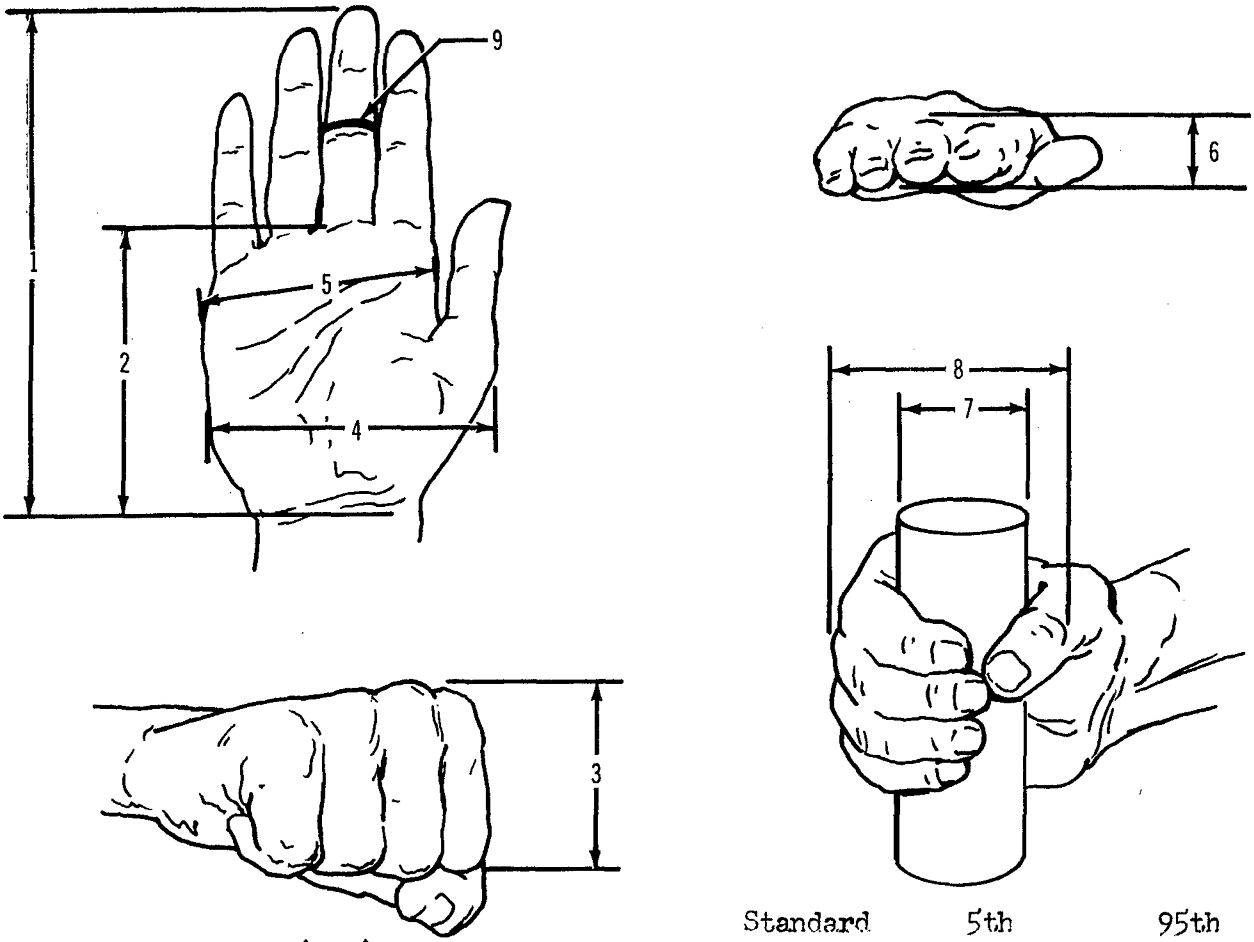
No.	Dimension (in.)	Source	Mean	Standard Deviation	5th Percentile	95th Percentile
1	Ear Breadth	1	1.44	.11	1.27	1.61
2	Ear Length	1	2.47	.16	2.21	2.73
3	Ear Length Above Ear Hole (Tragion)	1	1.17	.11	.99	1.35
4	Nose Length	1	2.01	.14	1.79	2.23
5	Nose Protrusion	1	.89	.11	.72	1.08
6	Hairline(Crinion) to Top of Nose (Nasion)	5	2.49	.30	2.00	2.98
7	Outside Corner of Eye to Bottom Edge of Front of Cheek Bone	5	1.53	.13	1.32	1.74
8	Upper Ear-Cheek Junction to Lower Ear-Cheek Junction	5	1.97	.16	1.71	2.23
9	Ear Hole ($\approx$ Tragion) to Lower Ear-Cheek Junction	5	1.25	.13	1.04	1.46
10	Jaw Angle (Gonion) to Point of Chin ($\simeq$ Menton)	5	3.84	.23	3.46	4.22

Figure 5. STANDARD HEAD AND NECK DIMENSIONS (Cont)



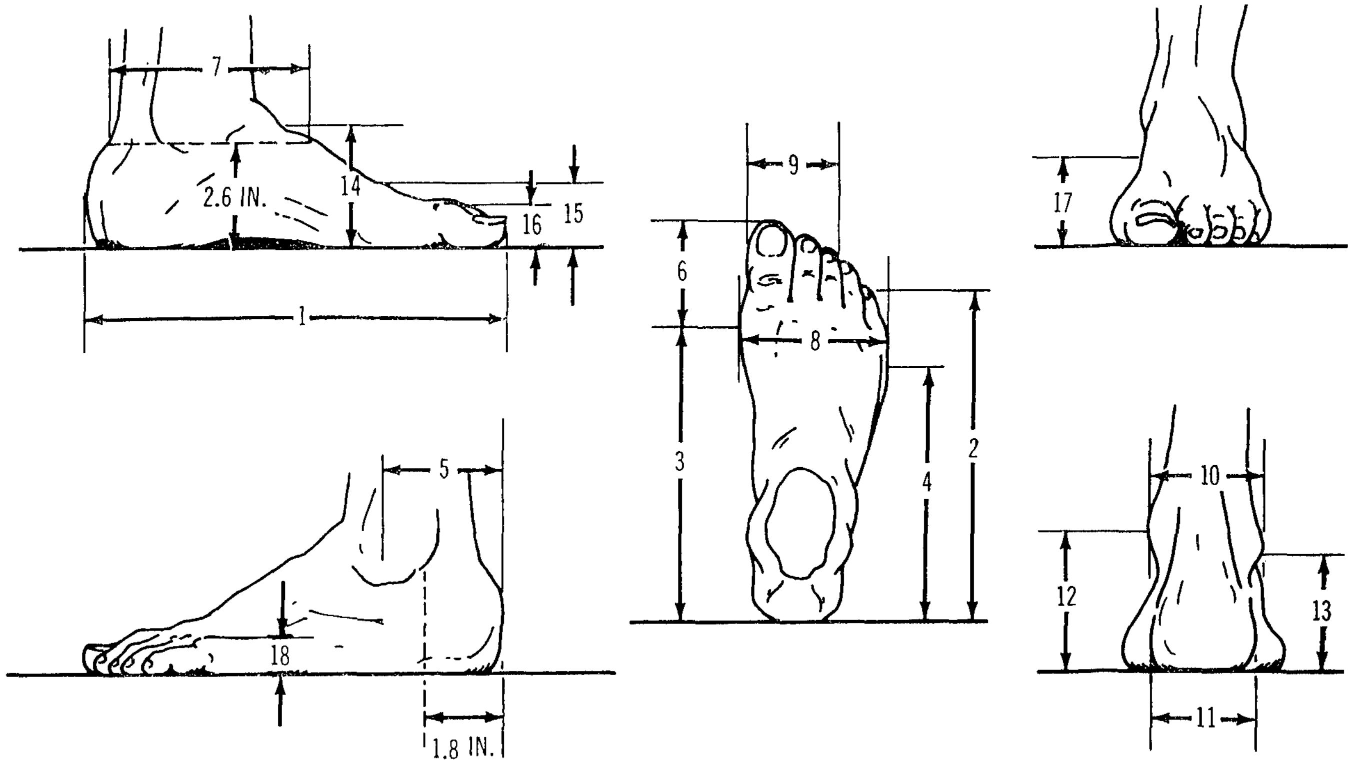
No.	Dimension (in.)	Source	Mean	Standard Deviation	5th Percentile	95th Percentile
1	Thumb Web to Index Fingertip	8	4.50	.30	4.00	5.00
2	Thumb Web to Second Knuckle, Index Finger	8	2.64	.26	2.22	3.06
3	Web to Tip of Thumb	8	2.32	.17	2.03	2.61
4	Web to Tip of Index Finger	8	2.85	.20	2.52	3.18
5	Web to Tip of Middle Finger	8	3.32	.21	2.98	3.66
6	Web to Tip of Ring Finger	8	2.89	.17	2.61	3.17
7	Web to Tip of Little Finger	8	2.20	.19	1.89	2.51
8	First Knuckle to Tip of Thumb	8	2.44	.13	2.23	2.65
9	Thumb Length	8	4.69	.24	4.29	5.09
10	Thumb Thickness	8	.76	.04	.69	.83
11	Thumb Breadth	8	.94	.06	.84	1.04
12	Index Finger Thickness	8	.74	.04	.67	.81
13	Index Finger Breadth	8	.89	.04	.79	.93
14	Middle Finger Thickness	8	.77	.05	.69	.85
15	Middle Finger Breadth	8	.89	.04	.82	.96
16	Ring Finger Thickness	8	.72	.04	.65	.79
17	Ring Finger Breadth	8	.83	.04	.76	.90
18	Little Finger Thickness	8	.63	.04	.56	.70
19	Little Finger Breadth	8	.73	.04	.66	.80

Figure 6. STANDARD HAND DIMENSIONS



No.	Dimension (in.)	Source	Mean	Standard Deviation	5th Percentile	95th Percentile
1	Hand Length	1	7.49	.34	6.9	8.0
2	Palm Length	1	4.24	.21	3.89	4.60
3	First Joint Knuckle to Second Joint Knuckle Length, Middle Finger	1	2.67	.12	2.49	2.85
4	Maximum Hand Breadth at Thumb	1	4.07	.21	3.73	4.42
5	Maximum Hand Breadth Across First Joint Knuckles	1	3.48	.16	3.22	3.74
6	Minimum Thickness of First Knuckle, Middle Finger	1	1.17	.07	1.05	1.28
7	Thumb-Middle Finger-Touch Grip Diameter	1	1.90	.14	1.62	2.05
8	First Knuckle Middle Finger to Second Knuckle Thumb Grip Clearance for Thumb Middle Finger Touch Around 1.90" Cylinder	1	4.09	.21	3.72	4.44
9	Middle Finger Hole Diameter	1	.86	.05	.79	.93

Figure 6. STANDARD HAND DIMENSIONS (Cont)



No.	Dimensions (Standing in.)	Source	Mean	Standard Deviation	5th Percentile	95th Percentile
1	Foot Length	1	10.50	.45	9.8	11.3
2	Heel to Tip of Small Toe Length	6	8.25	.41	7.6	8.9
3	Heel to Inside Ball of Foot Length	1	7.64	.34	7.1	8.2
4	Heel to Outside Ball of Foot Length	6	6.28	.37	5.7	6.9
5	Heel to Outside Ankle Bone (Lat. Malleolus)	7	3.32	.19	3.0	3.6
6	Inside Ball to Tip of Great Toe	6	2.78	.20	2.4	3.1
7	Ankle Length at 2.6" Above Sole	6	4.38	.26	3.9	4.8
8	Foot Breadth	1	3.80	.19	3.5	4.1
9	Width of First Three Toes	6	2.75	.18	2.4	3.0
10	Width of Ankle Joint	1	2.95	.15	2.7	3.2
11	Heel Breadth, 1.8" from Back of Heel	6	2.75	.15	2.5	3.0
12	Inside Ankle Bone (Med. (Mall.) Height	1	3.45	.21	3.1	3.8
13	Outside Ankle Bone (Lat. (Mall.) Height	1	2.73	.22	2.4	3.1
14	Dorsal Arch Height	6	3.08	.21	2.7	3.4

Figure 7. STANDARD FOOT DIMENSIONS WHILE STANDING

No.	Dimensions (Standing in.)	Source	Mean	Standard Deviation	5th Percentile	95th Percentile
15	Inside Ball of Foot Height	6	1.53	.09	1.4	1.7
16	Great Toe Height	6	1.08	.10	.9	1.2
17	Sole of Foot (Plantar) Arch Height	6	1.12	.20	.8	1.4
18	Outside Ball of Foot Height	6	1.00	.08	.9	1.1

Figure 7. STANDARD FOOT DIMENSIONS WHILE STANDING (Cont)

complex biological material with many properties. In itself, it is not a link but its rigidity forms a functional dimension. The link in relation to the body system is a straight or core line which extends through a body segment and terminates at both ends in axes or hinge points. The adjacent members rotate about these axes.

From the standpoint of developing a stick-man or link-man model, the number of links is somewhat arbitrary. However, to reduce the complexity of the model, it may be desirable to ignore minor link movements and to group a chain of links into units (e.g., the 25 separate vertebral links above the sacrum into the lumbar link and the thoracic link). This was the approach taken by Dempster (Ref. 11) (See Figs. 8 and 9), based on the work of Harless (Ref. 13) and in the Boeing proposal to JANAIR. The link dimensions shown in Fig. 9 are for the 5th, 50th, and 95th percentile Air Force flying personnel.

As a first approach to a computerized man-model, the above concept appears quite reasonable. The differences between the link models of Dempster (Ref. 11) and Boeing are minor. BOEMAN-I includes joints on the spinal column and the eyes. The thoracic joint between the lumbar and thoracic links is located near the waist line, and only one joint is used at the shoulder in BOEMAN-I.

The shoulder joint arrangement of BOEMAN-I differs from that shown in the 1955 study of Dempster (Ref. 11) but agrees with the 1967 study, Dempster and Gaughran (Ref. 60). In Dempster (Ref. 11), the shoulder is simulated by two joints and a 3.5 cm connecting link called the scapular link. The subject report lists the scapular link as "an unsatisfactory

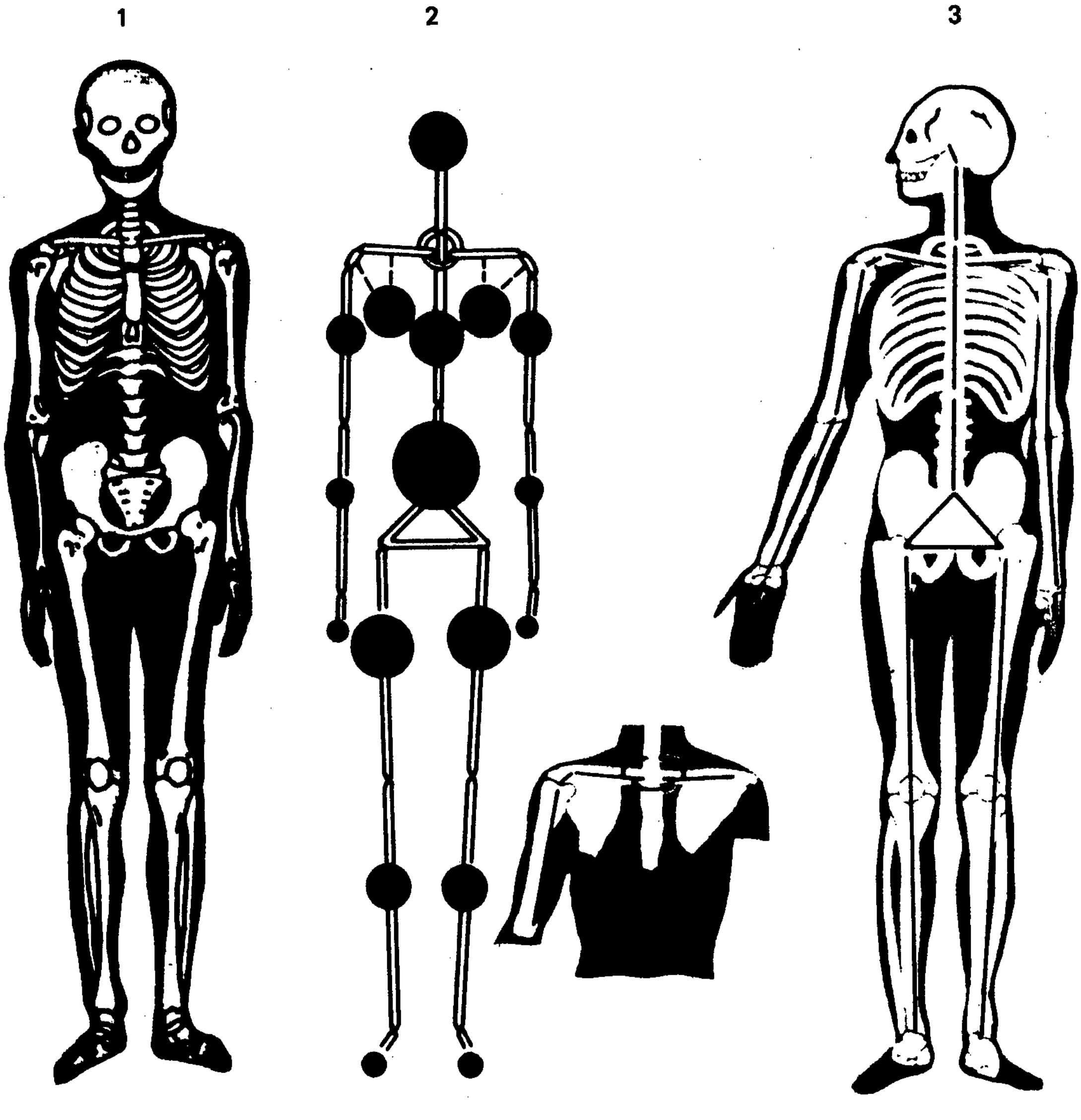


Figure 8. PLAN OF BODY LINKS AS DESCRIBED BY DEMPSTER

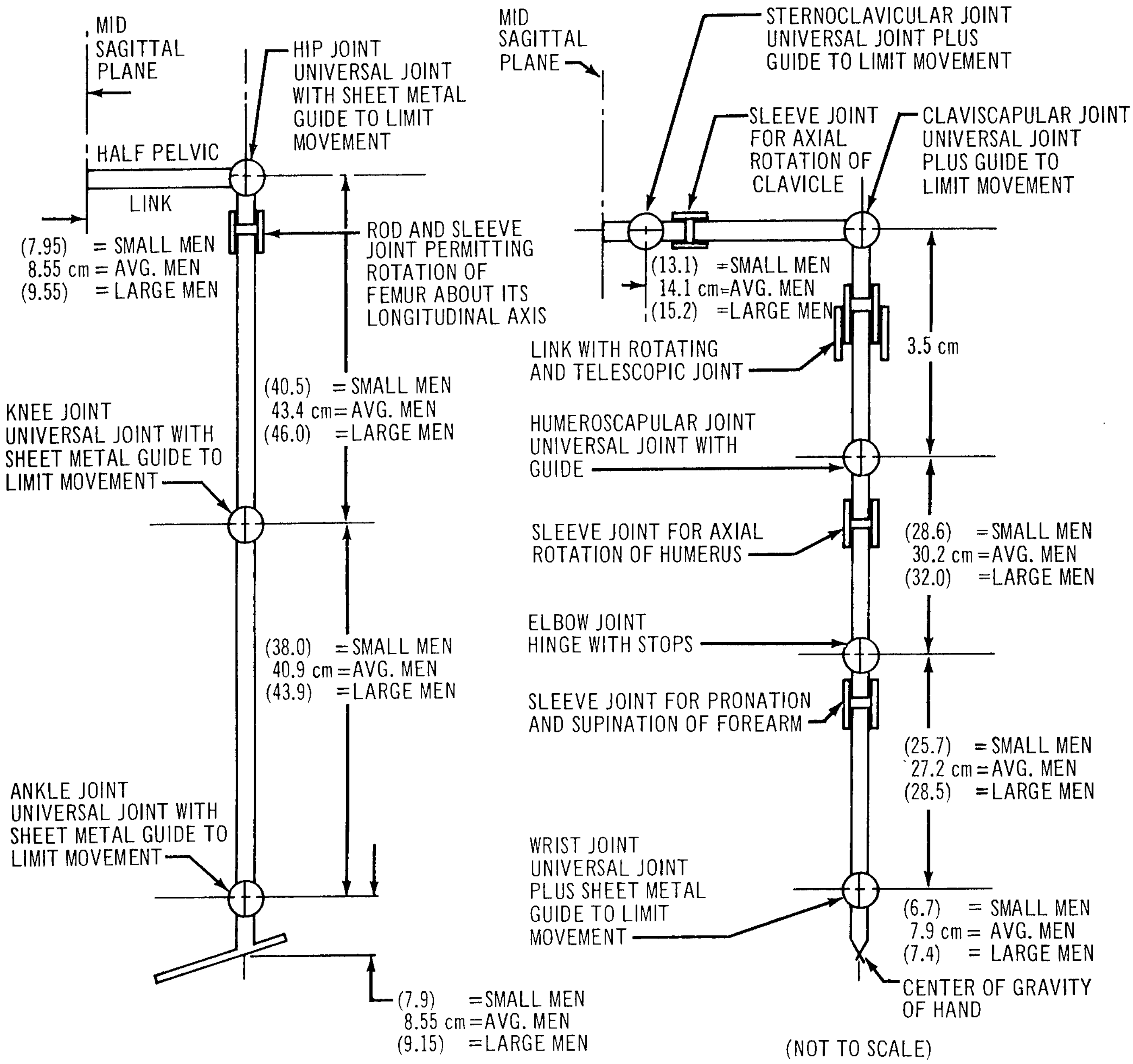


Figure 9. GENERAL LINK PLAN OF THE LOWER AND UPPER LINK SYSTEMS

From Dempster (Ref. 11)

measurement" of approximately 3.5 cm for all sized individuals. Preliminary evaluations of BOEMAN-I indicate the scapular link and a second joint at the shoulder provide an unnecessary complication with no increase in accuracy of joint location synthesis. The shoulder joint for BOEMAN-I has been simplified by extending the clavicle 0.4 in to mate with the humeral link in a single "shoulder joint"; i.e., the clavicular joint now has zero degree of freedom. This makes the link length compatible with external body dimensions and circumferences and is represented by the dashed lines shown in Fig. 1.

While the concept of a link man is reasonable, it must be realized that there are limitations to its applicability and that the dimensions of the links are somewhat variable. Dempster (Ref. 11) was most thorough in his analysis of the link dimensions of the limbs but there still remain some inherent limitations. The link dimensions for the limbs in Dempster (Ref. 11) are based, among other things, on the correlation between stature and four skeletal bones (humerus, femur, radius, and tibia) (See Fig. 10). Figures 10 and 11 help illustrate some of the variation inherent in the link dimensions.

In addition, Dempster (Ref. 11) discusses some of the limitations such as the variability in long bone length for any given stature of Army personnel, the variability of the centers of joint rotation, the variance in the joint radii as an inverse function of bone length, the use of only three pelves for the transpelvic link determination, etc. However, even with these limitations, the link dimensions appear reasonable and quite usable from an engineering standpoint.

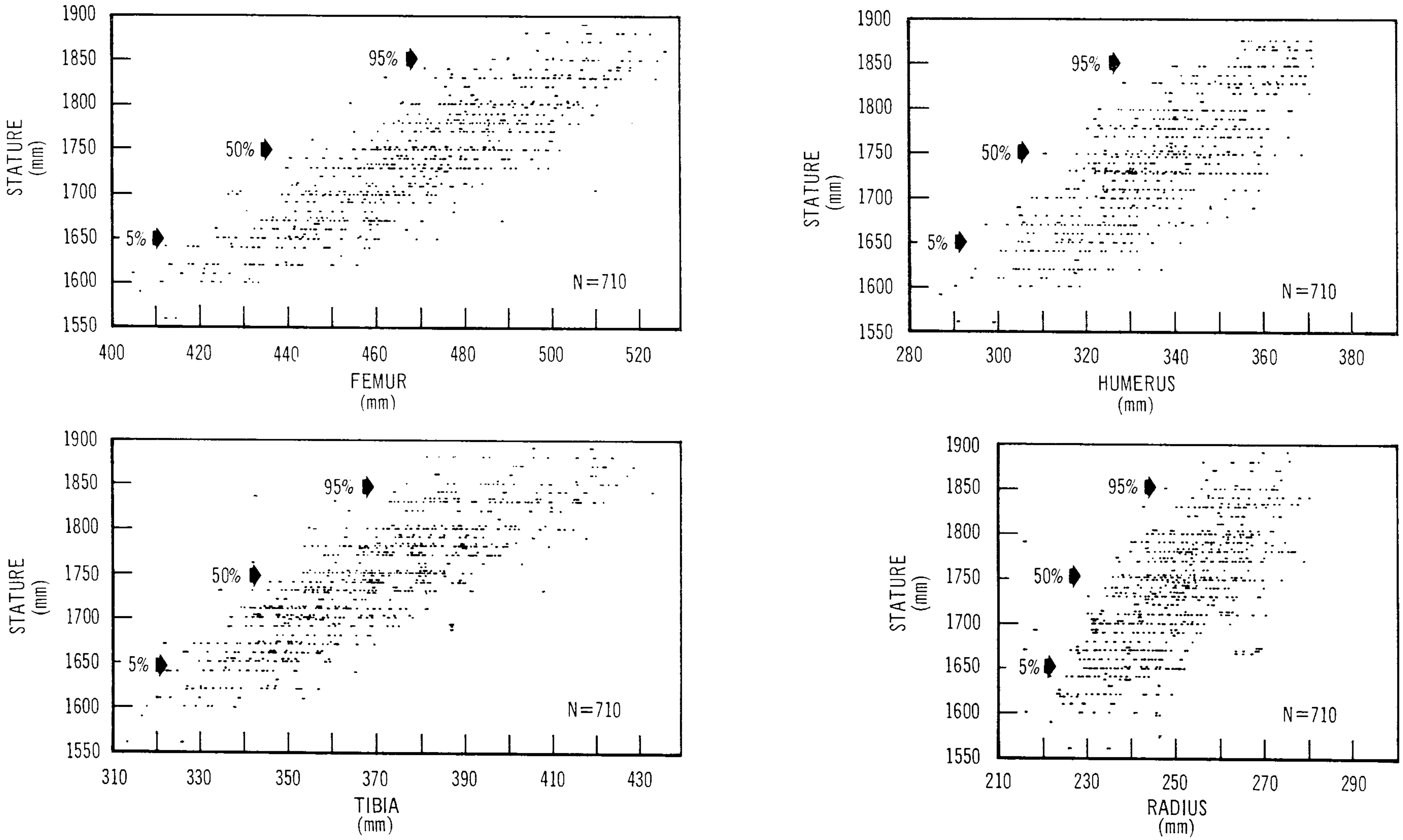


Figure 10. LONG BONE LENGTH AS A FUNCTION OF STATURE

Plot of raw data of Trotter and Gleser (12) on the relationships between the length of 4 skeletal limb bones and living stature; the data apply to 710 white army males. Arrows point to statures corresponding to the 5th, 50th, and 95th percentile of Air Force flying personnel.

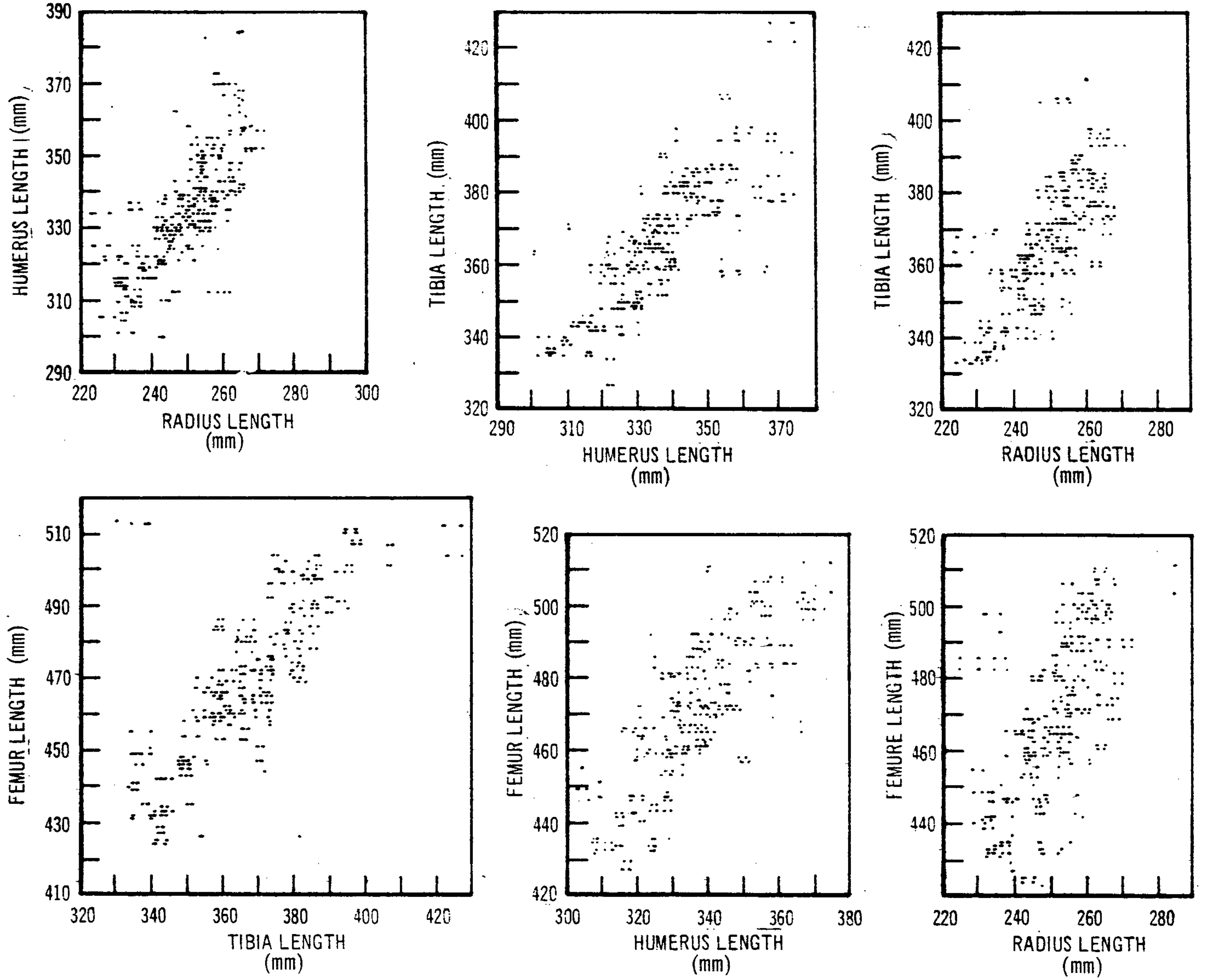


Figure 11. CORRELATION OF LONG BONE LENGTHS

(Comparable to 5th, 50th, and 95th percentiles of Air Force flying personnel) From raw data of Trotter and Glesser (12).

Dempster (Ref. 11) was primarily concerned with the seated operator and, hence, his limbs. Therefore, the link dimensions of the torso were not investigated. For BOEMAN-I, these torso dimensions were required and, hence, derived by Boeing research personnel from existing anthropometric data.

Table 2 gives the link dimensions for BOEMAN-I with values for the 1st, 50th, and 99th percentiles as well as standard deviations. Table 3 is from Dempster (Ref. 11) and gives some bone and link lengths for the 5th, 50th, and 95th percentiles as well as the relationships between the two measurements. Table 4 is from Dempster, et al. (Ref. 54) and gives regression equations relating upper and lower link lengths. The dimensions and standard deviations for link numbers 1 through 4 were taken from Hertzberg, et al. (Ref. 1). The dimensions for link numbers 11, 12, 13, 17, 18, 19, 20, and 21 were taken from Dempster (Ref. 11). The standard deviations for these links were calculated by averaging the differences between the dimensions reported for the 5th and 50th percentiles and the 50th and 95th percentiles and applying appropriate conversion factors.

Example:

Link #19 - Femoral Link: $\sigma = \dfrac{46.0 - 40.5}{2 \times 1.645} = 1.67$ cm

The dimension for link number 9 was assumed constant for all percentiles. The dimension for link number 18 (transpelvic) must be treated as a special case because the dimension is based on only three measurements, and does not have a normal distribution; hence, a standard deviation is not applicable. Its 1st and 99th percentile values were determined from

Table 2. Link Dimensions for BOEMAN-I

No.	Link	σ cm	σ in	1st Percentile cm	1st Percentile in	50th Percentile cm	50th Percentile in	99th Percentile cm	99th Percentile in
1	Stature	6.19	2.44	161.3	63.5	175.6	69.1	190.3	74.9
2	Eye Height, Standing	6.04	2.38	150.3	59.2	164.4	64.7	178.5	70.3
3	Eye Height, Sitting	3.22	1.27	72.4	28.5	80.0	31.5	87.3	34.4
4	Interpupillary	0.36	0.14	5.5	2.2	6.3	2.5	7.2	2.8
5	Eyeball to Head	0.00	0.00	14.0	5.5	14.0	5.5	14.0	5.5
6	Head	0.23	0.09	14.7	5.8	15.2	6.0	15.7	6.2
7	Neck (Horizontal)	0.00	0.00	3.8	1.5	3.8	1.5	3.8	1.5
8	Neck (Vertical)	0.15	0.06	10.2	4.0	10.4	4.1	10.9	4.3
9	Inter-Clavicular	0.00	0.00	5.1	2.0	5.1	2.0	5.1	2.0
10	Clavicular*	0.64	0.25	13.7	5.4	15.2	6.0	16.5	6.5
11	Humeral	1.03	0.41	27.8	10.9	30.2	11.9	32.6	12.8
12	Radial	0.85	0.34	25.2	9.9	27.2	10.7	29.2	11.5
13	Hand (Wrist to Hand C.G.)	0.21	0.08	6.5	2.6	7.0	2.8	7.5	3.0
14	Hand (Extended)	0.86	0.34	17.0	6.7	19.0	7.5	21.0	8.3
15	Thoracic	0.94	0.37	29.7	11.7	31.8	12.5	34.0	13.4
16	Lumbar	0.32	0.13	4.0	1.6	4.6	1.8	5.3	2.1
17	Pelvic (Vertical)	0.62	0.25	7.9	3.1	9.3	3.7	10.7	4.2
18	Pelvic (Horizontal)	0.97	0.38	15.5	6.1	17.1	6.7	20.1	7.9
19	Femoral	1.67	0.66	39.5	15.6	43.4	17.1	47.3	18.6
20	Tibial	1.79	0.71	36.7	14.4	40.9	16.1	45.1	17.8
21	Foot (Ankle to Floor)	0.38	0.15	7.7	3.0	8.6	3.4	9.5	3.7

*Shoulder link has zero length for BOEMAN-I; 0.4" added to clavicular length.

Table 3

Estimation of Some Link Dimensions of Air Force Flying Personnel Based on Ratios from Cadaver Measurements

	95th Percentile cm	50th Percentile cm	5th Percentile cm
Clavicle length (40.7% of biacromial width)	17.6	16.3	15.1
Biacromial width	43.1	40.1	37.0
Clavicle Link (86.4% of clavicle length)	15.2	14.1	13.1
		(sternal end 26 mm from midline)	
Shoulder Link		±3.5	
Humerus length	35.9	33.9	32.1
Humerus Link (89.0% of humerus length)	32.0	30.2	28.6
Radius length	26.6	25.4	24.0
Radius Link (107.0% of radius length)	28.5	27.2	25.7
Hand length	20.4	19.0	17.6
Hand Link (wrist center to the hand center of gravity) (20.6% of humerus length)	7.4	7.0	6.7
Pelvic Link (horizontal component) (37.2% of femur length)		17.1	
Femur length	50.3	47.5	44.3
Femur Link (91.4% of femur length)	46.0	43.4	40.5
Tibial length	39.9	37.2	34.5
Tibial Link (110.0% of tibial length)	43.9	40.9	38.0
Foot length (heel to toe I)	28.6	26.7	24.8
Foot Link (talus center point to center of gravity) (30.6% of foot length)			
Vertical distance from midtalus to floor level		8.6	

Adapted from Dempster (Ref. 11)

Table 4

Regression Equations Relating Link and Anthropometric Dimensions of the Upper and Lower Limbs

From Dempster, et al. (Ref. 54)

Empirical Equation (mm)	Standard Error of Estimate	Correlation Coefficient
Ulna Length = 23.7922 + (0.9810 x Radius Length)	4.58	.94
Humerus Length = 64.4829 + (0.9683 x Radius Length)	9.97	.81
Radial Link Length = 1.0709 x Radius Length)	----	---
Humeral Length = 58.0752 + (0.9646 x Radius Length)	8.92	.94
Radius Length = 7.9728 + (0.9002 x Ulna Length)	4.39	.94
Humerus Length = 74.0856 + (0.9688 x Ulna Length)	11.07	.76
Radial Link Length = 0.9870 x Ulna Length	----	---
Humeral Link Length = 66.2621 + (0.8665 x Ulna Length)	9.90	.94
Femur Length = 125.6879 + (0.9067 x Tibia Length)	18.39	.73
Fibula Length = 31.3653 + (0.9252 x Tibia Length)	5.28	.97
Tibial Link Length = 1.0776 x Tibia Length	----	---
Femoral Link Length = 132.8253 + (0.8172 x Tibia Length)	16.57	.73
Femur Length = 101.8815 + (0.9629 x Fibula Length)	11.45	.87
Tibia Length = 8.6266 + (1.0119 x Fibula Length)	5.53	.97
Tibial Link Length = 8.2184 + (1.0904 x Fibula Length)	5.95	.97
Femoral Link Length - 92.0397 + (0.8699 x Fibula Length)	10.34	.87

Fig. 17. Fortunately, this dimension is not a critical part of the computerized man-model for cockpit geometry evaluation and the 50th or 99th percentile values can be used in the majority of applications when needed.

As previously reported, the thoracic joint was assumed to be located at the waist. The lumbar joint is located somewhere between the thoracic and hip joints. The vertical pelvic and lumbar link dimensions of BOEMAN-I were based on the assumption that the ratio of the lumbar link to the vertical pelvic link is 1:2 and that the total length of these two links is the difference between the standing waist height and the standing hip joint height. The standing waist height is reported in Hertzberg, et al. (Ref. 1), for the 1st, 50th, and 99th percentiles. The standing hip height was determined by adding the dimensions of link numbers 19, 20, and 21 for the same three percentiles. The standard deviations for the two links were calculated from the 1st and 99th percentiles.

The thoracic link is assumed to originate at the thoracic joint and terminate where it intersected the interclavicular joints. It should be noted that there is no joint at this intersection. The thoracic link was determined by taking the difference between the standing shoulder joint height, reported by Dreyfuss (Ref. 62) and the standing waist height of Hertzberg (Ref. 1). The standard deviation was calculated from the 1st and 99th percentile dimensions.

The neck joint was determined by finding a point from which an arc could be drawn which best approximated the arc movement of the eye from $-67\text{-}1/2^{\circ}$ to $+90^{\circ}$ (See Fig. 12). The horizontal distance from the eye to this point

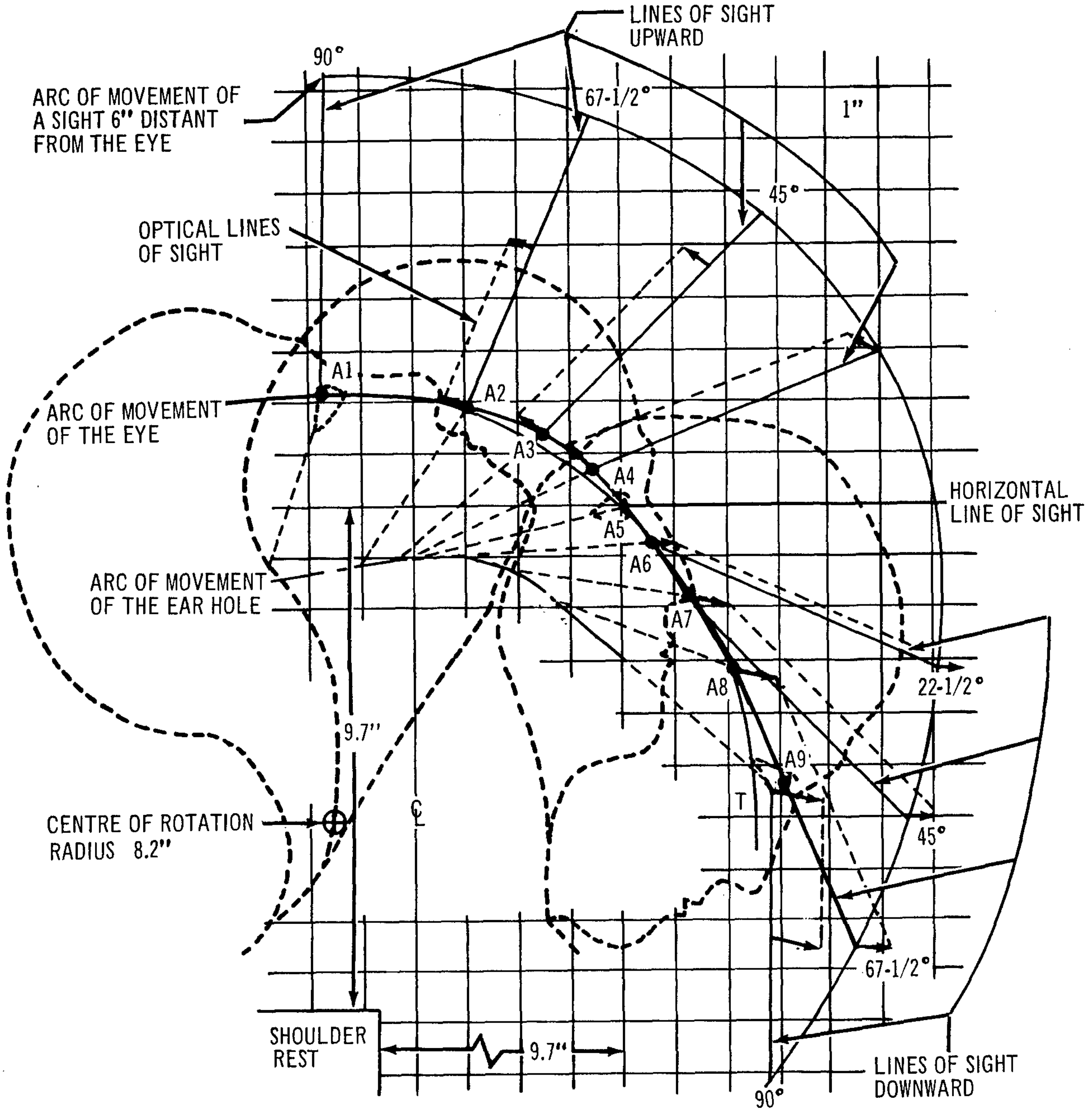


Figure 12. RANGE OF HEAD AND EYE MOVEMENTS IN THE VERTICAL PLANE

(From Ref. 16)

is link number 5 and because of the lack of any statistical data, it is assumed constant for all percentiles. Dimension number 7 is based on the eye point being 4 inches ahead of the shoulder point as reported in MIL-STD-803A-3 (Ref. 15). Because link number 5 is constant for all percentiles, so is link number 7.

It was felt that seated and standing eye heights were critical as they provide an excellent reference point. Therefore, the difference between the standing eye height in Hertzberg (Ref. 1) and the computed shoulder height must be accounted for by vertical neck and head links (link numbers 6 and 8) for each percentile. From Fig. 12, the head link was available (vertical distance from the center of rotation to the horizontal line of sight) and, therefore, if this is assumed to be for the 50th percentile, a ratio of the head link to the neck link was available and this same ratio was applied to the 1st and 99th percentile dimensions needed to make the respective eye heights correct. Standard deviations were calculated from these values. It should be noted that Sutro, et al. (Ref. 52) have found that the horizontal and vertical centers of head rotation are not coincident and they suggest the use of a compromised center of rotation. At this time, it is felt that the critical movement in vision in an aircraft is the vertical movement; hence, for the present the neck joint will be retained as is. If future requirements indicate that separate centers of rotation would constitute a significant improvement, another joint can be inserted in the horizontal neck link to account for horizontal head movement. Based on the work of Sutro, et al. (Ref. 52), this joint would be located 2.06 inches inward from the present vertical center.

Figures 13 through 20 are of cumulative distributions on probability paper of some of the link dimensions based on the findings of Dempster (Ref. 11). A comparison of the 1st and 99th percentiles based on these figures is in reasonable agreement with those calculated and reported in Table 2.

3.1.3 Body Parameters

3.1.3.1 General

The BOEMAN-I program and the follow-on refinements require that certain body parameters be defined. These parameters are volume, density, mass, mass centers, and moments of inertia for the human body as a whole as well as for certain body segments.

These parameters, especially those for body segments of live humans, are difficult to obtain. There is a paucity of data available and the problem is further hindered by the fact that the majority of the investigations which have been conducted have used a small number of subjects, quite often cadavers whose body sizes were significantly smaller than the present population and the experimental methods are sometimes open to question. Dempster and Gaughran (Ref. 60) were quite critical of some of the older investigations. Only recently do we find the techniques and equipment developed which will permit reliable investigations on live humans with physical size comparable to that of today's flying personnel.

The relative proportions of the various body segments have been of interest since ancient times, particularly to those professions that had to select or classify subjects according to their body build. In the

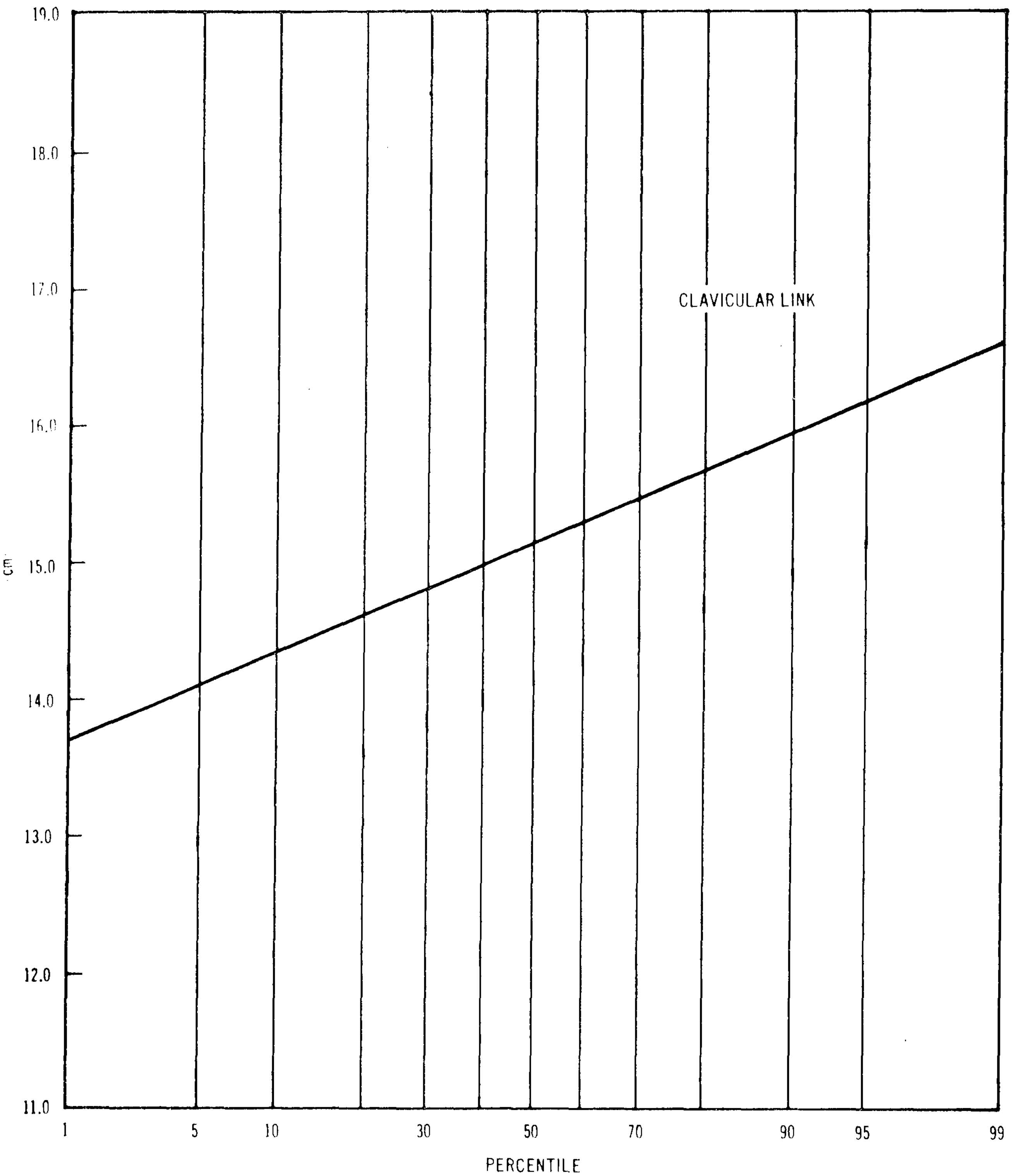


Figure 13. CUMULATIVE DISTRIBUTION OF CLAVICULAR LINK LENGTHS

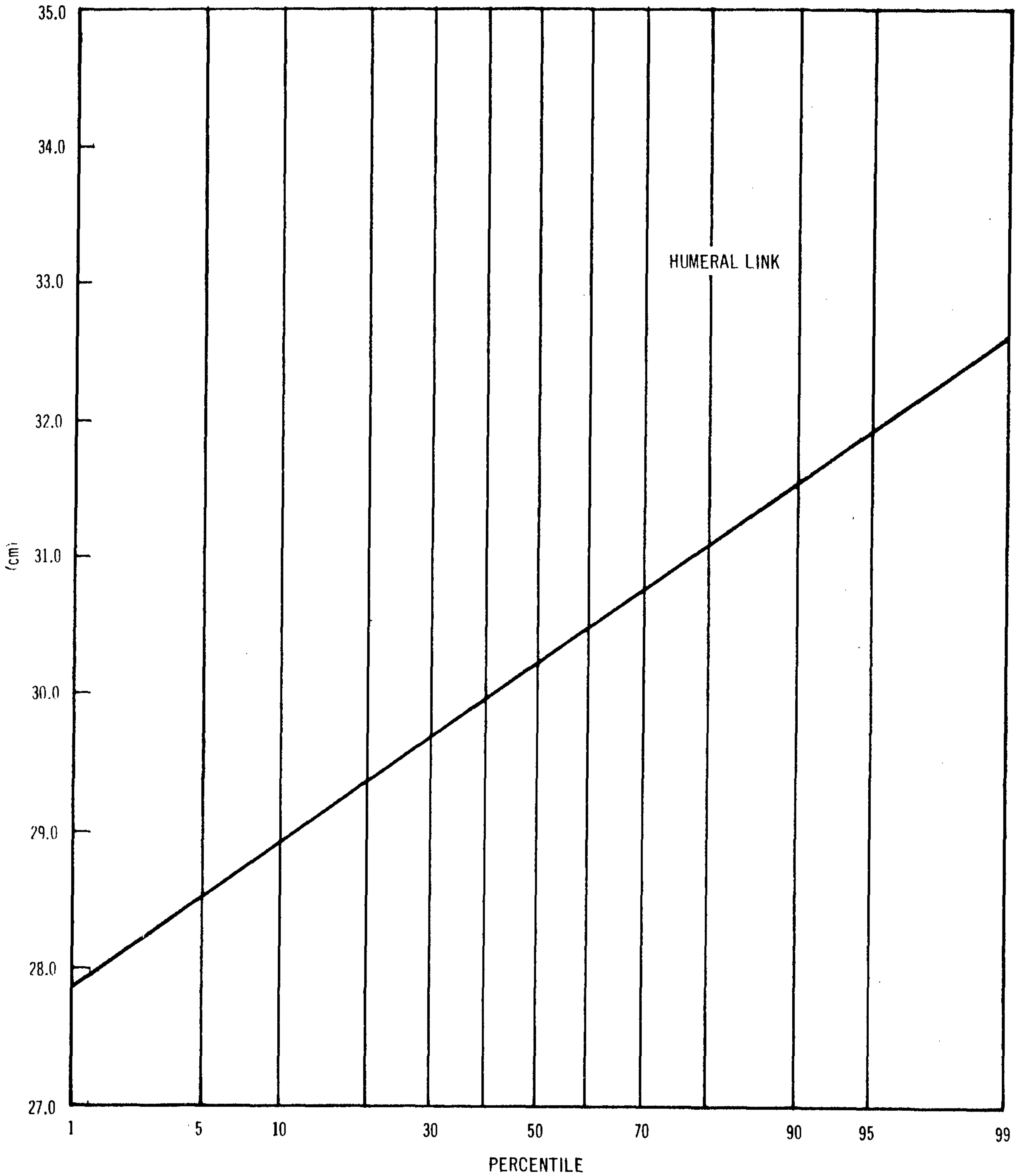


Figure 14. CUMULATIVE DISTRIBUTION OF HUMERAL LINK LENGTHS

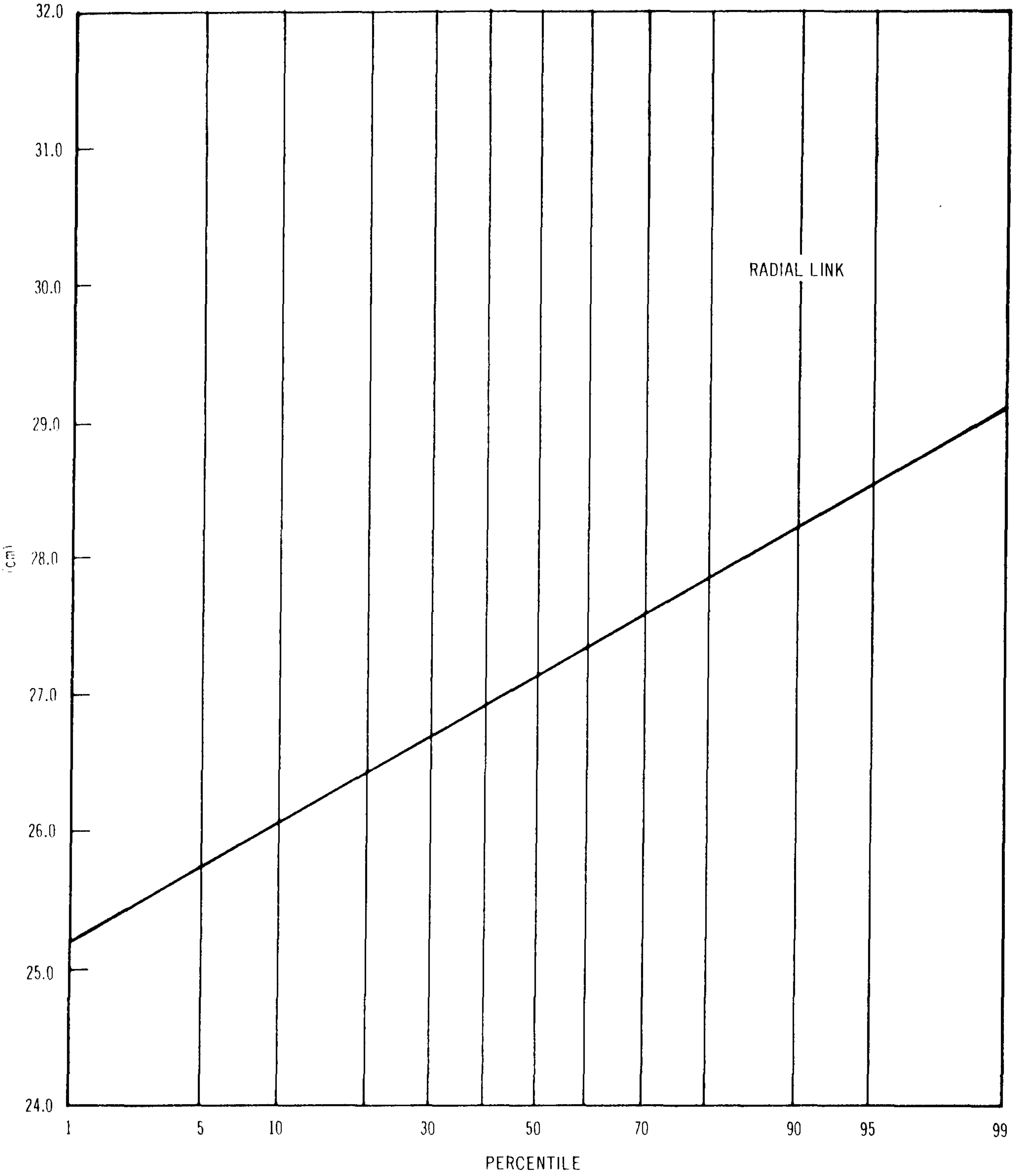


Figure 15. CUMULATIVE DISTRIBUTION OF RADIAL LINK LENGTHS

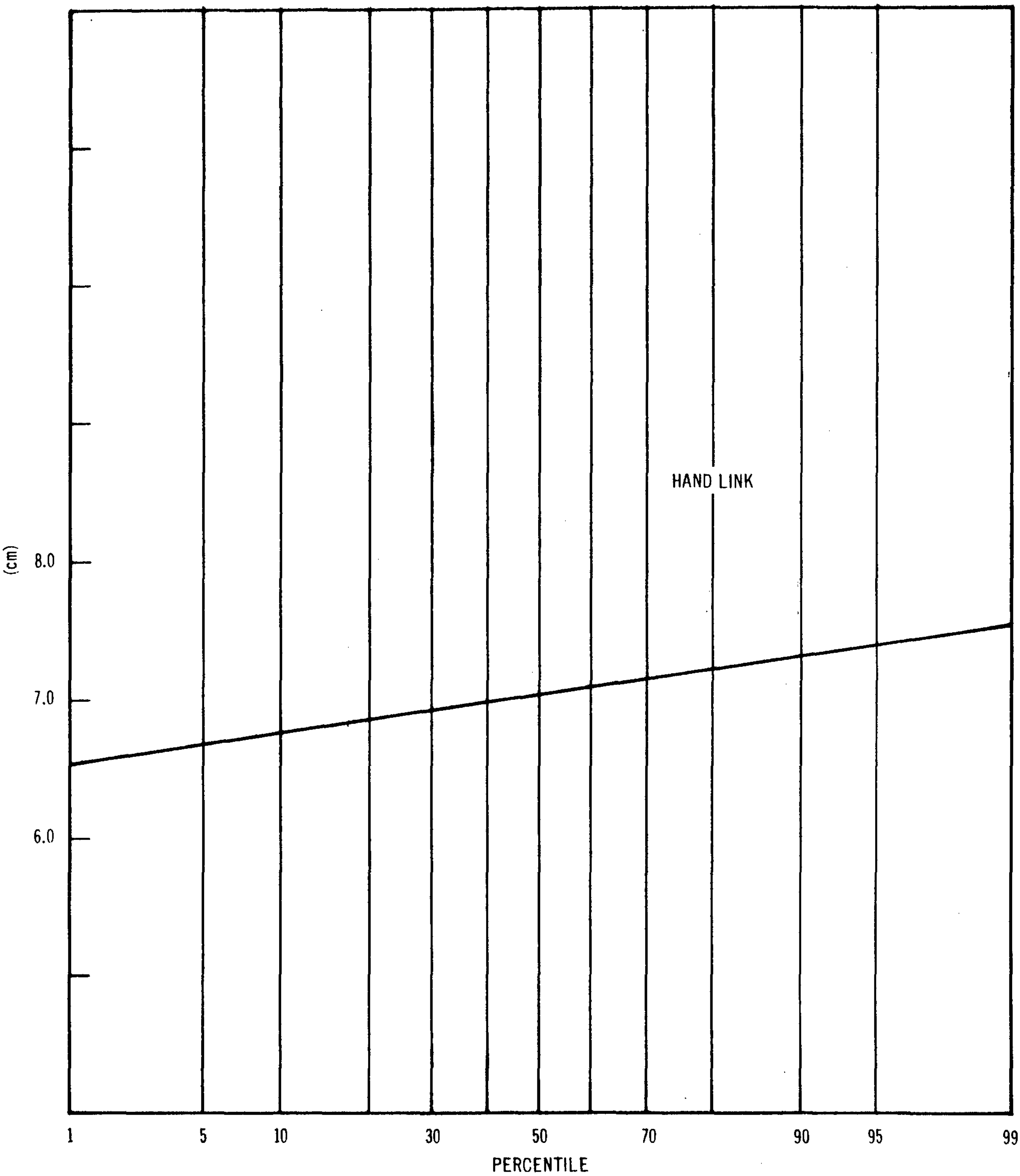


Figure 16. CUMULATIVE DISTRIBUTION OF HAND LINK LENGTHS

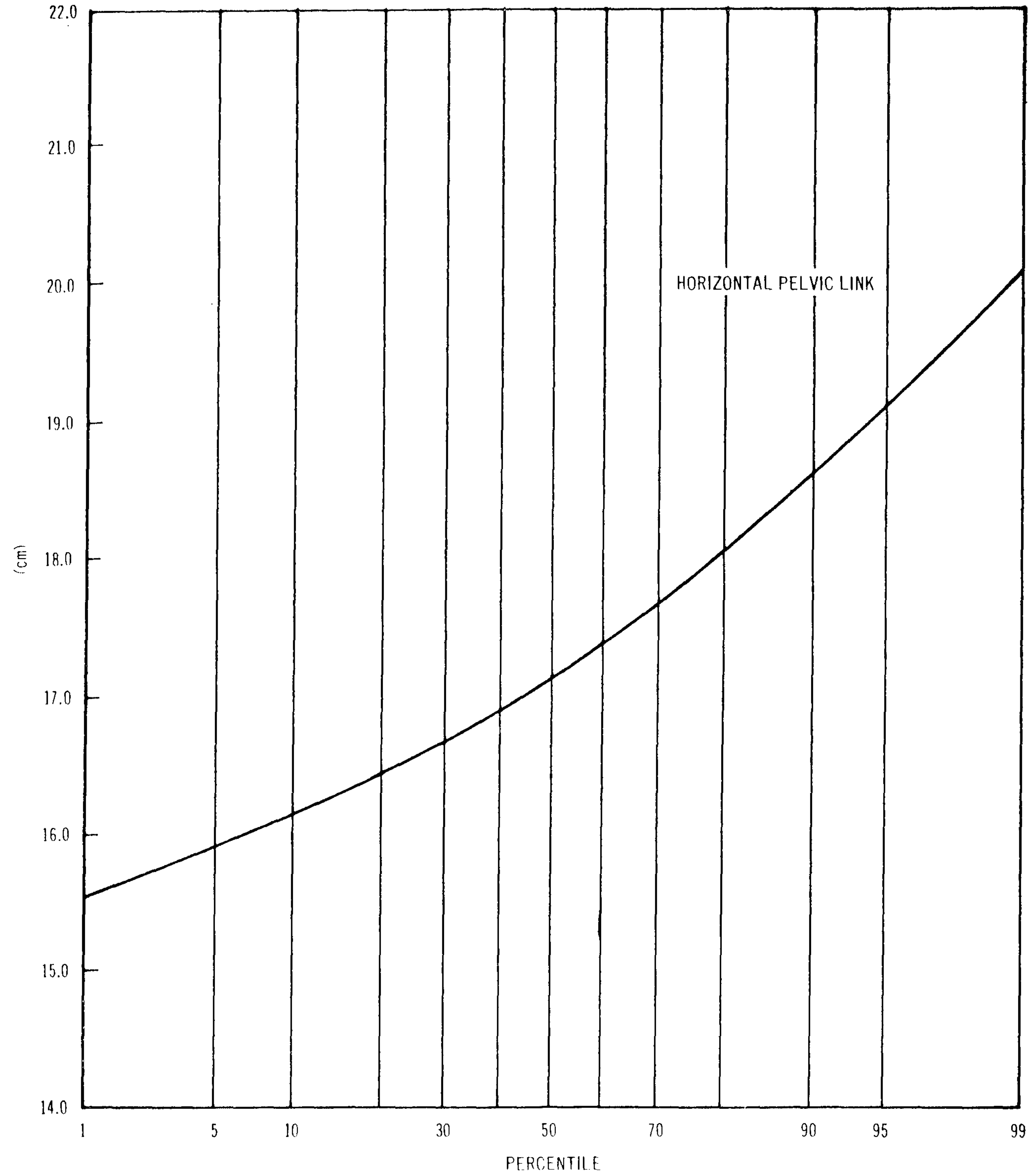


Figure 17. CUMULATIVE DISTRIBUTION OF HORIZONTAL PELVIC LINK LENGTHS

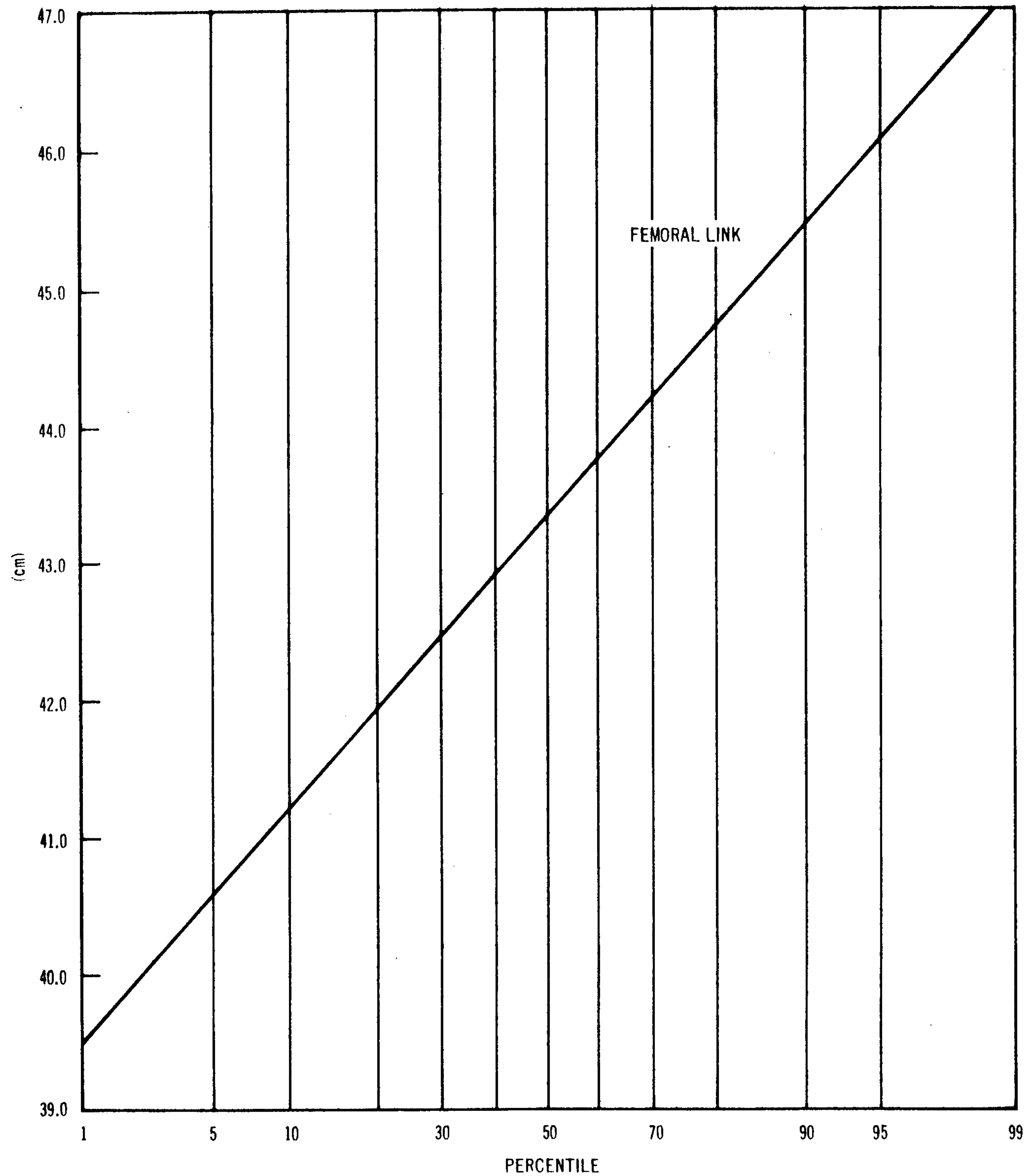


Figure 18. CUMULATIVE DISTRIBUTION OF FEMORAL LINK LENGTHS

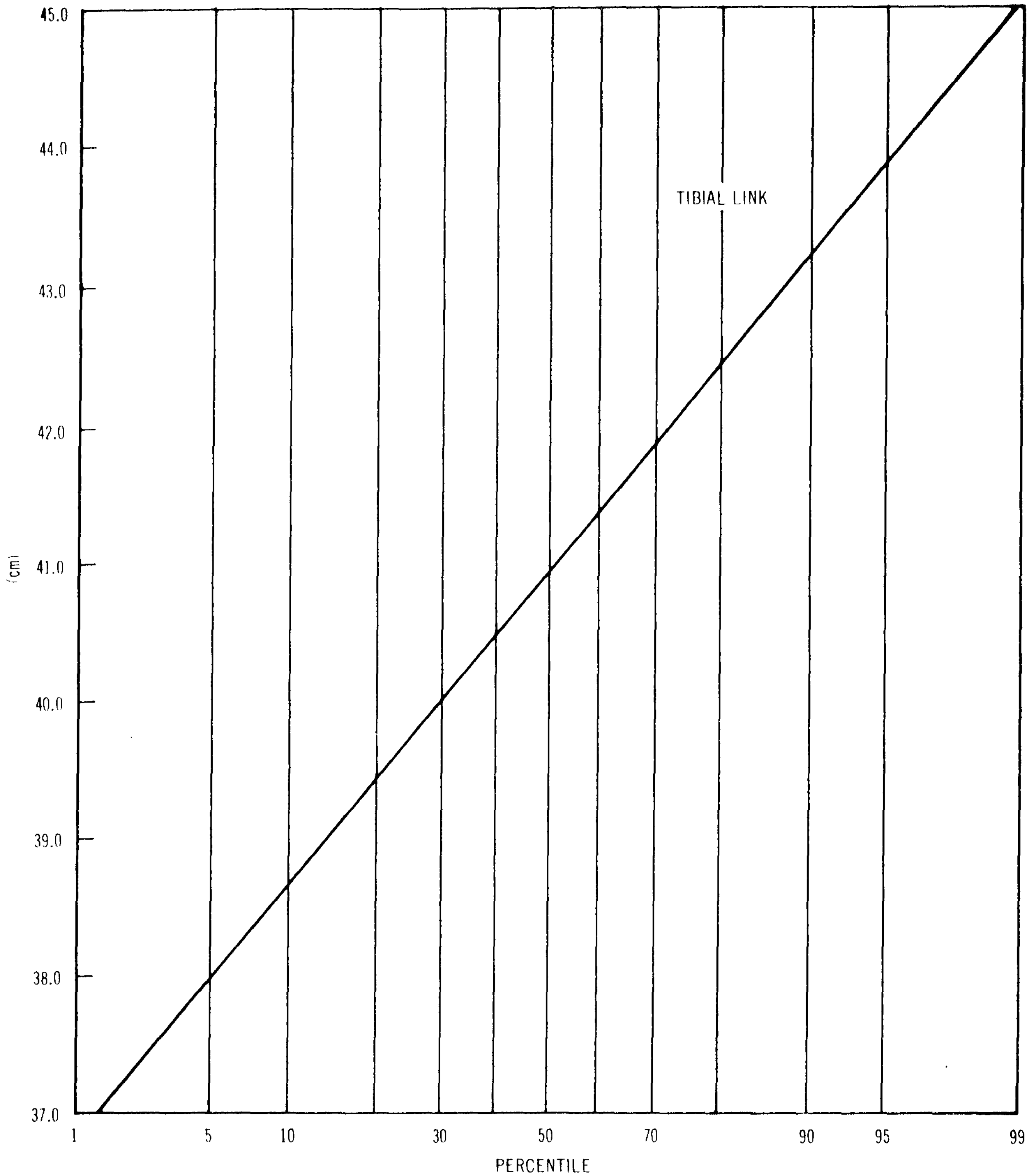


Figure 19. CUMULATIVE DISTRIBUTION OF TIBIAL LINK LENGTHS

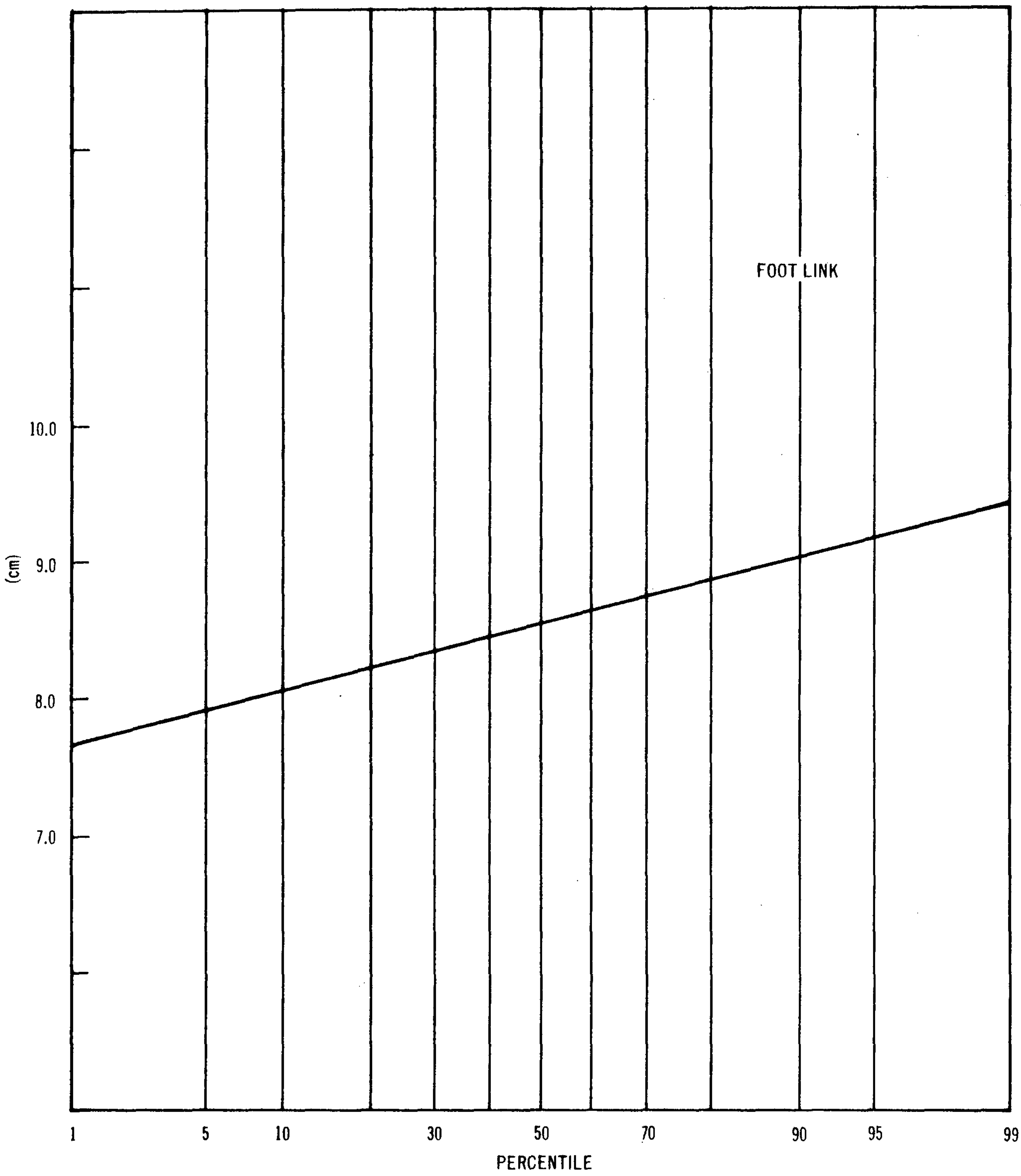


Figure 20. CUMULATIVE DISTRIBUTION OF FOOT LINK LENGTHS

beginning the interest was in the length relationships of the various body segments. The first modules were established by the Egyptians as far back as the third millenium before Christ. New standards were developed by Greek and Roman artists and architects and some such standards were attempted as late as the beginning of this century.

The determination of segment volumes or masses, however, was not attempted until the middle of the nineteenth century. The first of such studies was undertaken by Harless (Ref. 13) in Germany. He started his studies with the determination of the absolute and relative lengths of the body and its segments. From this he proceeded to the determination of the volume of body segments. He assumed for his studies that in any one segment its density or specific gravity is homogenous along its entire length. On this basis he was able to determine the absolute and relative masses of body segments.

For his investigations, Harless dissected five male cadavers and three female cadavers. His final report, in 1860, a treatise on "The Static Moments of the Human Body", used only the data gathered on two subjects. The results obtained by Harless were compared with those of others and those of the recent study by Drillis and Contini (Ref. 14).

In 1884, C. Meeh (Ref. 17) investigated body segment volumes of ten living subjects (8 males and 2 females).

In 1889, Braune and Fischer (Refs. 18, 19 and 20) made a very careful study of several cadavers. In the final report, the weight and height of the three male cadavers used were close to the average data of the German soldier of that period. Braune and Fischer (Ref. 19) introduced

for body parameter determinants the use of coefficients. They determined the masses of the various segments and measured their lengths from which they established three useful coefficients, C_1, C_2 and C_3 which will be referred to several times later. The work of Braune and Fischer was so thorough that it has been used uncritically as a standard up until now, despite the fact that there exist pronounced differences in populations.

The most recent studies are those of Bernstein (Ref. 21) in Russia and Dempster (Ref. 11) and Drillis and Contini (Ref. 14) in the United States. With his co-workers at the Russian All-Union Institute of Experimental Medicine in Moscow, Bernstein in the 1930's carried out an extensive investigation of body segment parameters of living subjects. Excerpts of this investigation were published by him in his chapters on movement in the book "Physiology of Work", by Konradi, Slonim and Farfel.

Dempster (Ref. 11) conducted his studies at the University of Michigan from 1952 to 1954. His investigations were based on eight cadavers. Volume, mass, density, location of mass center and mass moments of inertia were reported. During the 1960's, Drillis and Contini (Ref. 14) performed studies at New York University.

3.1.3.2 **Total** Body Parameters

The studies of Braune and Fischer (Ref. 19), Fischer (Ref. 21), Harless (Ref. 13), Bernstein (Ref. 21), Dempster (Ref. 11), Weinbach (Ref. 32), etc., while technically well received, have been used sparingly in BOEMAN-I for the reasons given above. Thus, the small amount of data which is available has been reduced even further. For BOEMAN-I, the majority of the body parameter data have been obtained from Drillis and Contini (Ref.

14), Santschi, et al. (Ref. 23) and DyBois, et al. (Ref. 24). The latter two computed moments of inertia and centers of gravity of the whole living human body.

In the studies by Santschi, et al. (Ref. 23), and DuBois, et al. (Ref. 24), a compound pendulum technique was used to determine total body centers of gravity and moments of inertia. The only assumption was mean body density to compute a small second-order buoyancy correction factor. Figure 21 shows the reference landmarks for the location of the whole body center of gravity. Table 5 and Fig. 22 give a description of the body positions used in the investigation. The Santschi, et al. (Ref. 23) study gives total body centers of gravity and moments of inertia for eight body positions for 66 semi-nude subjects. Figure 23 shows a scattergram of statures and weights of the subjects used. Table 6 gives the mean and standard deviations of the center of gravity and moments of inertia of the semi-nude subjects and Table 7 gives correlation equations of moments of inertia with stature and weight. Figure 24 is a pictorial representation of the center of gravity data from Table 6.

DuBois, et al. (Ref. 24) conducted a similar study with 19 subjects dressed in both pressurized and unpressurized flying suits in a seated body position. Figure 25 is a scatter diagram of statures and weights of the subjects used. Table 8 gives the mean and standard deviations of the centers of gravity and moments of inertia. Table 9 gives correlation equations of moments of inertia with stature and weight.

Figure 26 is a pictorial representation of the center of gravity data from Table 8. Table 10 provides results of the statistical analysis of

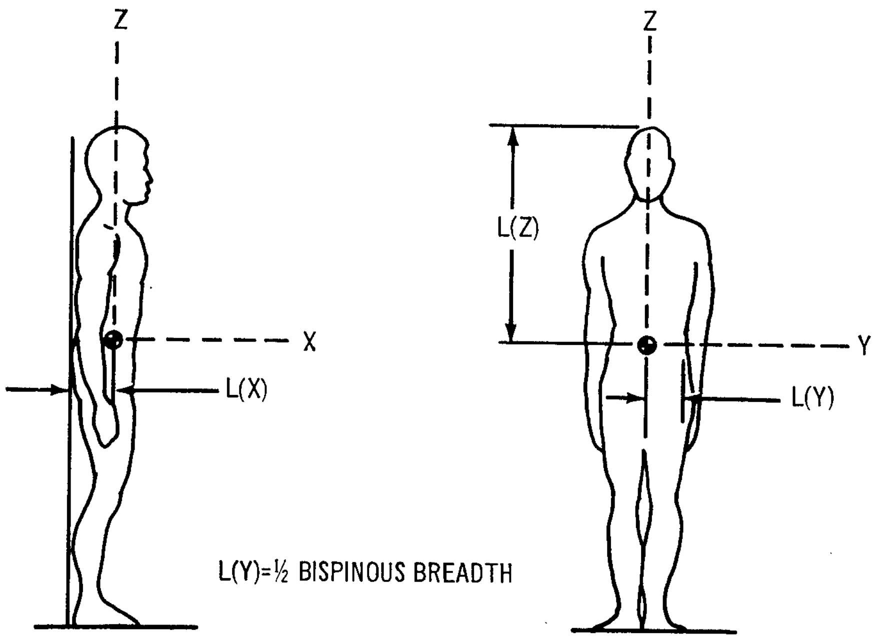


Figure 21. REFERENCE LANDMARKS FOR LOCATION OF TOTAL BODY CENTERS OF GRAVITY

From Santschi, et al. (Ref. 23)

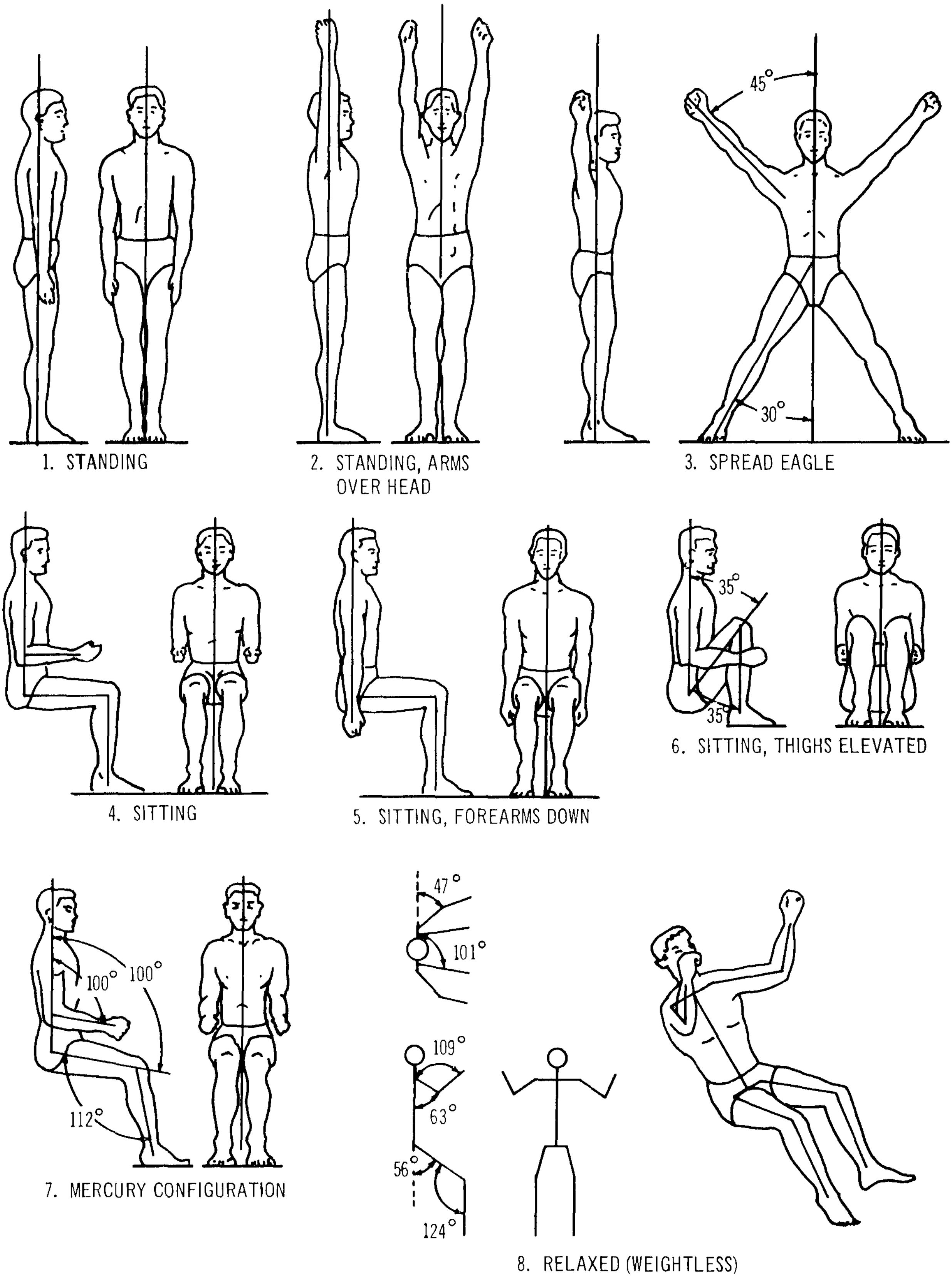


Figure 22. ILLUSTRATIONS OF THE BODY POSITIONS FOR CENTER OF GRAVITY AND MOMENT OF INERTIA MEASUREMENTS

From Santschi, et al. (Ref. 23)

SELECTION OF SUBJECTS (NUDE)

The sample of 66 male subjects was selected on the basis of stature and weight from North American Aviation employees to represent the Air Force population stature and weight characteristics described in Reference 1. For this total sample whose stature-weight scattergram is shown in Figure 7, 60 subjects are contained within the bounds of 1st and 99th percentile values of stature and weight and 50 within the area bounded by the 5th and 95th percentile values. The stature-weight correlation coefficient value for the total sample is approximately 0.6, in comparison with the Air Force population value of approximately 0.5 reported in Reference 6.

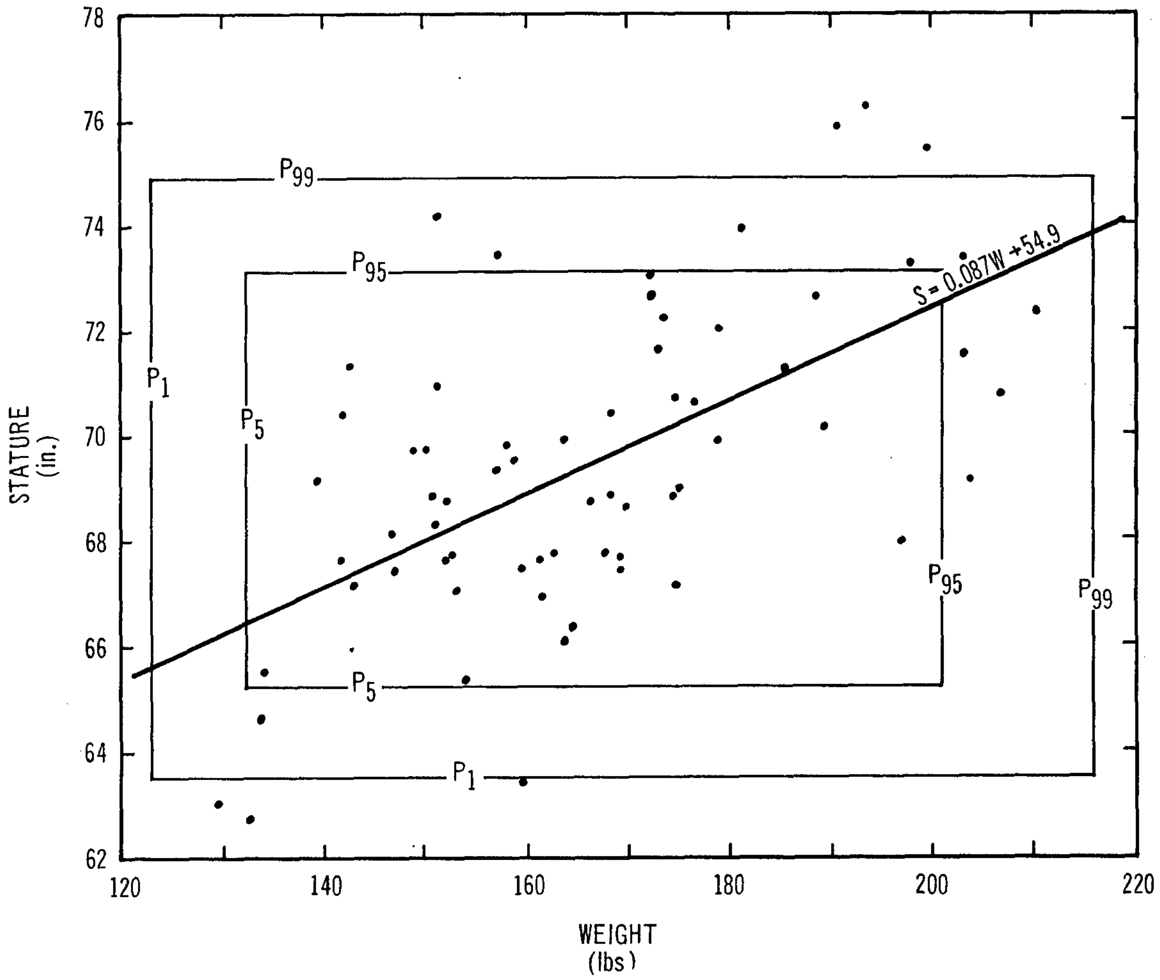
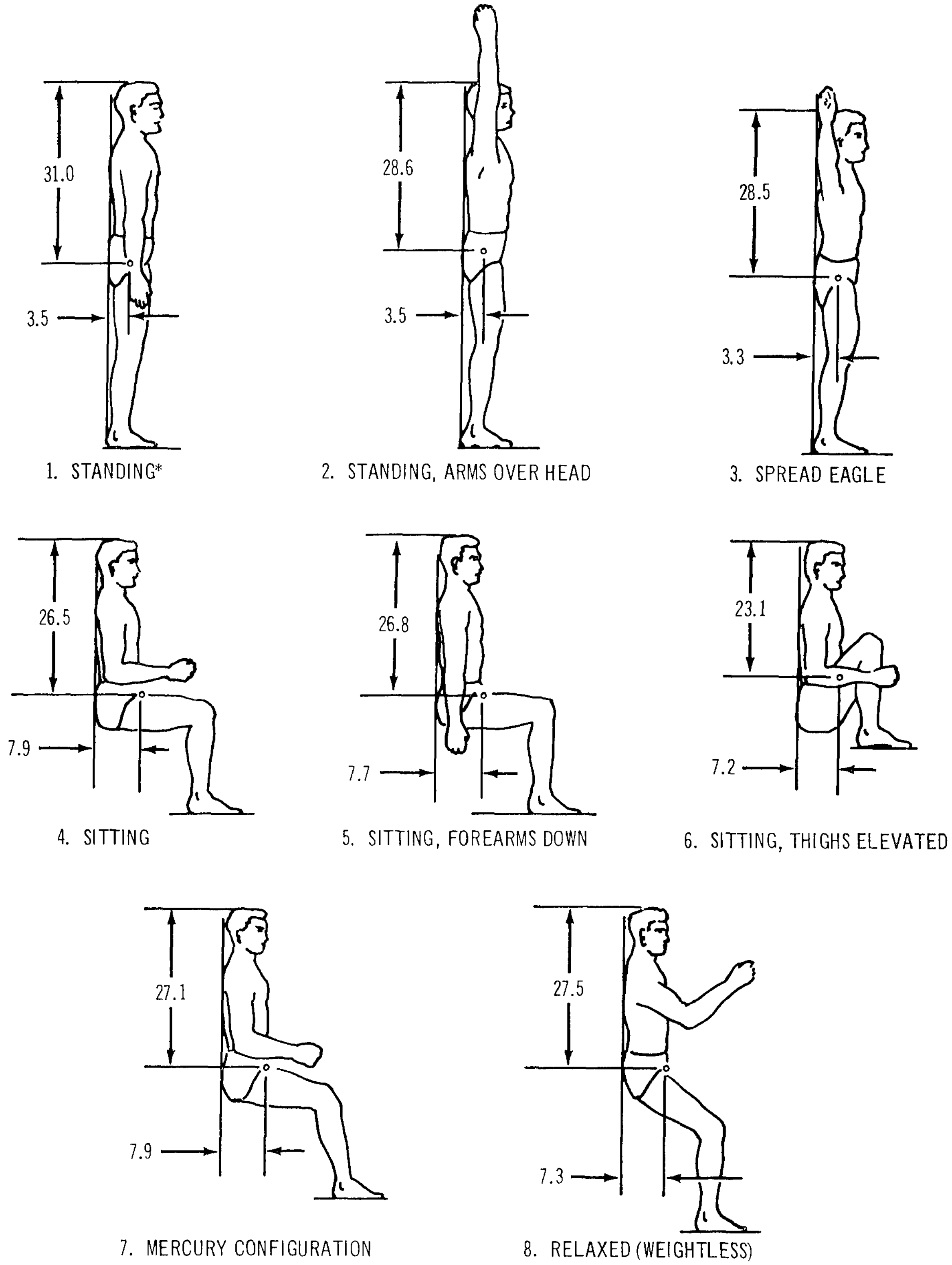


Figure 23. SCATTERGRAM OF STATURES AND WEIGHTS OF 66 MALE SUBJECTS USED TO DETERMINE CENTERS OF GRAVITY AND MOMENTS OF INERTIA

From Santschi, et al. (Ref. 23)



*DIMENSIONS ARE IN INCHES.
BODY SYMMETRY WITH RESPECT TO THE SAGITTAL PLANE IS ASSUMED.

Figure 24. ILLUSTRATIONS OF MEAN CENTERS OF GRAVITY OF SEMI-NUDE MALES IN EIGHT BODY POSITIONS
From Santschi, et al. (Ref. 23)

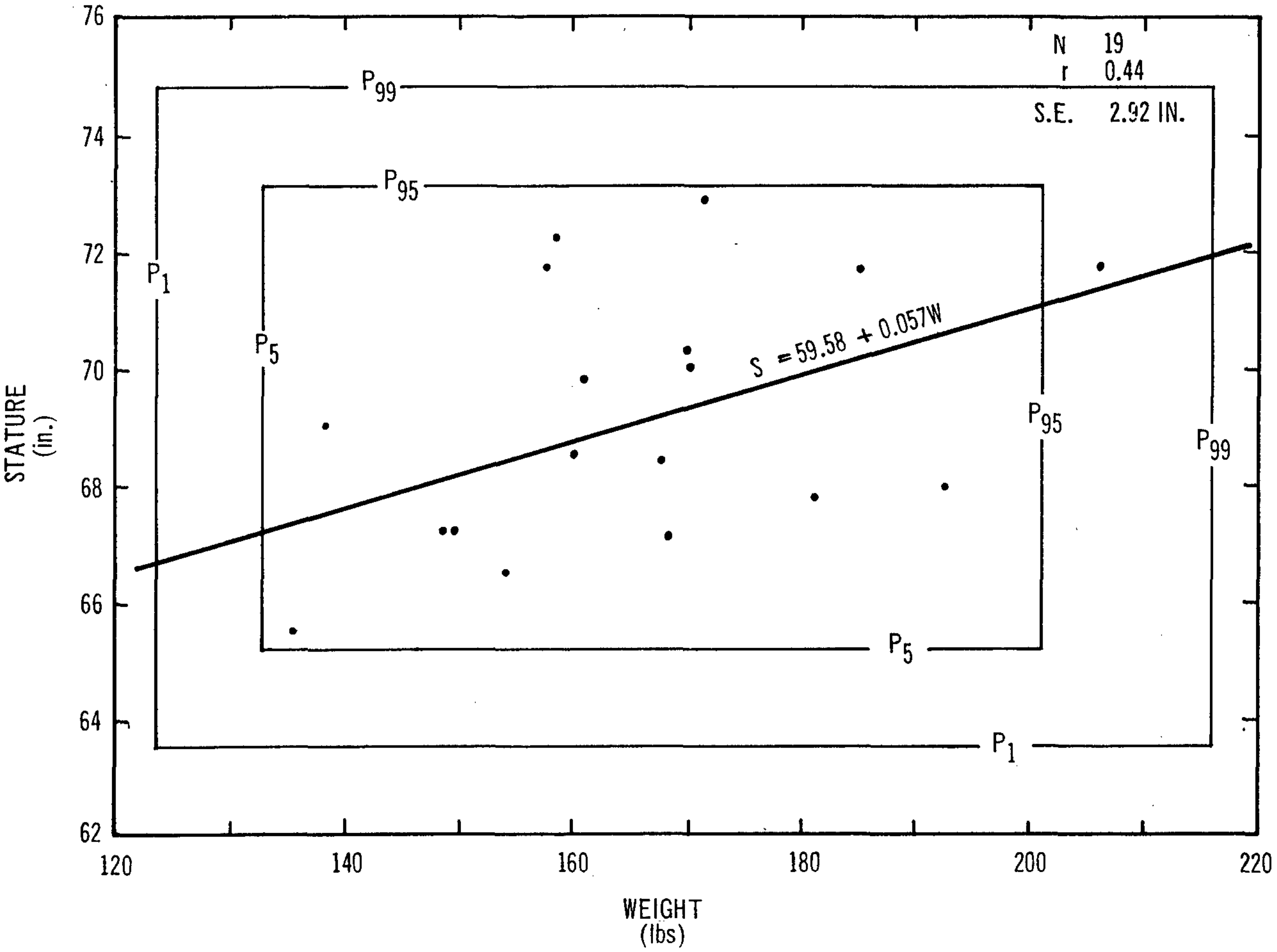


Figure 25. SUBJECT STATURE-WEIGHT SCATTERGRAM OF 19 PRESSURE SUITED MALES USED TO DETERMINE CENTERS OF GRAVITY AND MOMENTS OF INERTIA

From DuBois, et al. (Ref. 24)

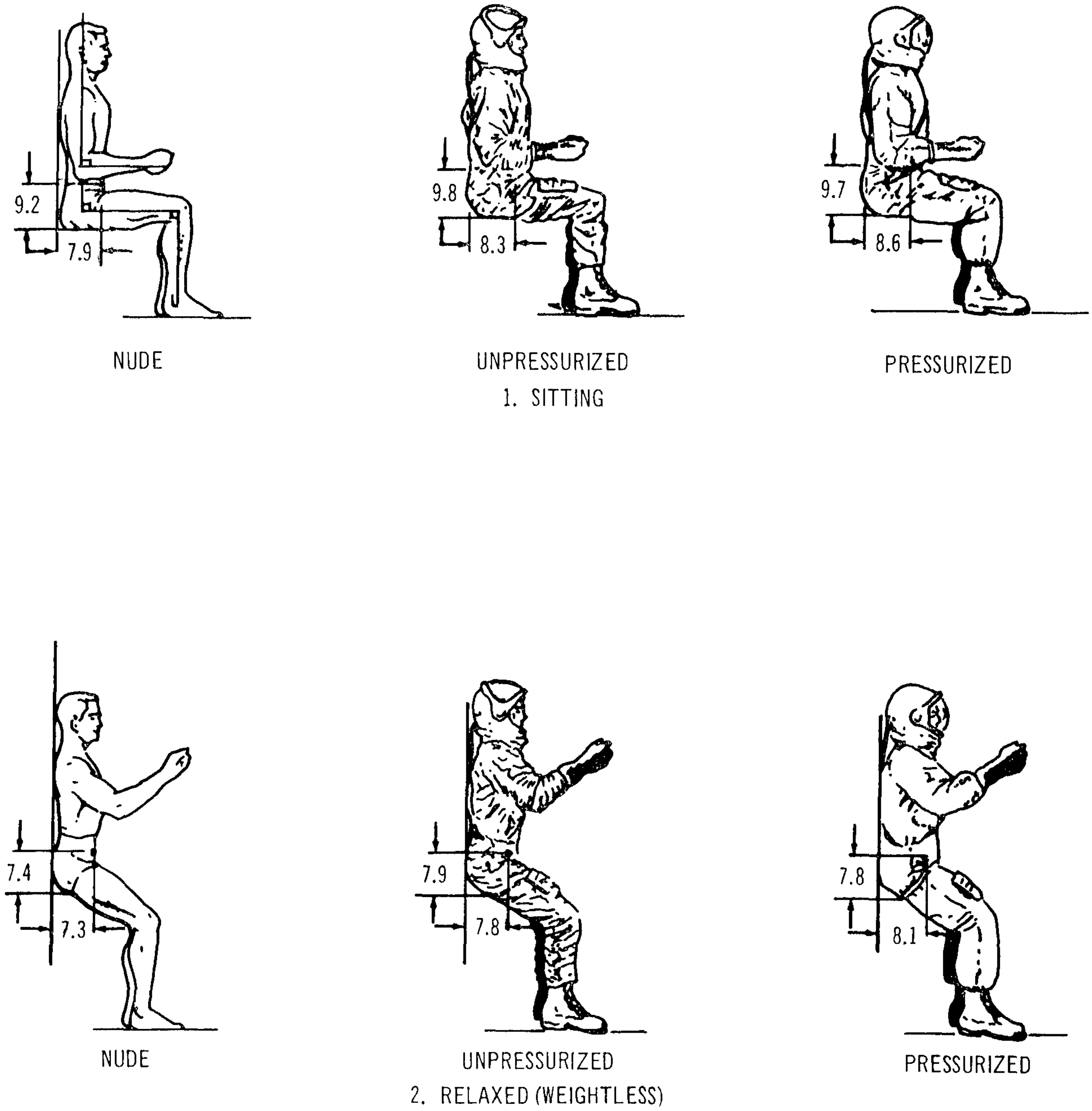


Figure 26. ILLUSTRATION OF MEAN CENTERS OF GRAVITY OF SEMI-NUDE AND PRESSURE SUITED MALES IN A SEATED POSITION

From DuBois, et al. (Ref. 24)

differences in moments of inertia between semi-nude, unpressurized, and pressurized subjects in a seated position.

While the thoroughness and attention to detail are apparent in the Santschi, et al. (Ref. 23) and DuBois, et al. (Ref. 24) reports, there remain unanswered questions. Duggar (Ref. 25) has suggested that there is a possibly significant damping effect of the muscles and joints. Also, assignment of coordinates of the center of gravity to one posture which were derived from measurements in another position (standing versus supine) must detract from the overall accuracy.

The method used by Drillis and Contini (Ref. 14) to determine the mass center of the whole body is one which employs a second class lever. In order to determine the X and Y coordinates (in a horizontal plane) of the whole body mass center, the subject is placed erect with his hands by his side on a board supported by a weighing scale at one end. Knowing the weight of the subject and the distance between supports, the scale reading establishes the line of action of the subject's weight, hence that of his center of mass.

Anthropometric data on the sample (Drillis and Contini (Ref. 14)) are given in Table 11. From these data a comparison between the sample and the population of Air Force personnel is obtained. Figure 27 illustrates the height and weight of the test sample along with those of previous investigators. The mean values differ significantly from that of the test sample. It would appear that the use of these other data would not be appropriate in studies concerned with United States adult males within the given age range and may not be appropriate even for other living populations.

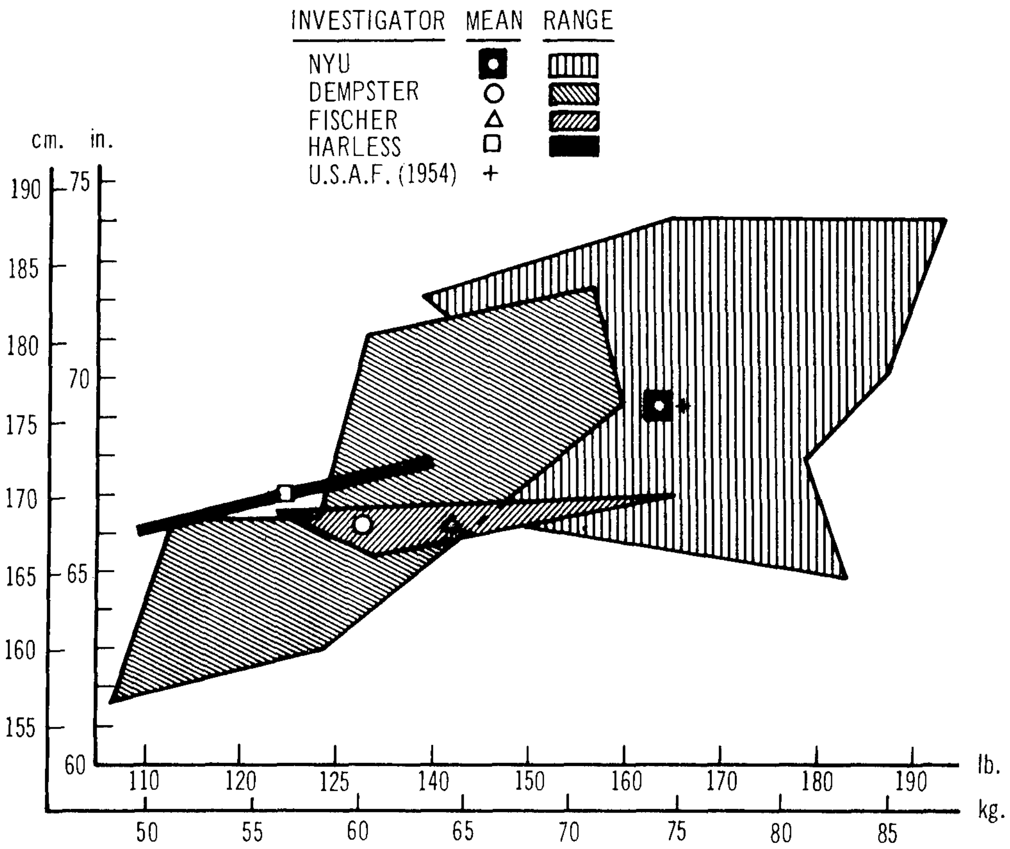


Figure 27. COMPARISON OF STATURE AND WEIGHT DATA OF VARIOUS INVESTIGATORS

From Drillis and Contini (Ref. 14)

Table 5

Description of Body Attitude Positions Investigated in Total Body Center of Gravity and Moment of Inertia Studies

1.	Standing	Subject stands erect with head oriented in the Frankfort plane and with arms hanging naturally at the sides as described in WADC TR 52-321 stature measurement (Ref. 1).
2.	Standing, Arms Over Head	Legs, torso and head same as position 1; upper extremities raised over head, parallel to Z-axis; wrist axes parallel to X-axis; hands slightly clenched.
3.	Spread Eagle	Torso and head same as position 1; subject against plane parallel to YZ plane; arms at 45° with Z-axis, legs at 30° with Z-axis; wrist axes parallel to YZ plane; hands slightly clenched.
4.	Sitting	Upper legs and forearms parallel to X-axis; upper arms, lower legs and spine parallel to Z-axis; soles parallel to XY plane; wrist axes parallel to Z-axis; head in Frankfort plane.
5.	Sitting, Forearms Down	Same as position 4, except forearms parallel to Z-axis, wrist axes parallel to X-axis.
6.	Sitting, Thighs Elevated	Same as position 4, except upper leg angle approximately 35° with YZ plane.
7.	Mercury Configuration	Same as position 4, except 100° back-thigh angle, thigh-leg angle 112°, forearm parallel to thigh.
8.	Relaxes (Weightless)	Position predicted to be assumed* by a human, relaxed in the weightless state. (See Fig. 27)

* Unpublished study by K. W. Kennedy, Anthropology Branch, Behavioral Sciences Laboratory, 6570th Aerospace Medical Research Laboratories, Wright-Patterson Air Force Base, Ohio.

From Santschi, et al. (Ref. 23)

Table 6

Centers of Gravity and Moments of Inertia of Semi-Nude Males in Eight Positions

	Axis	Center of Gravity (in.)		Moment of Inertia ($lb.in.sec.^2$)	
		Mean	S.D.	Mean	S.D.
1. Standing	x	3.5	0.20	115.0	19.3
	y	4.8	0.39	103.0	17.9
	z	31.0	1.45	11.3	2.2
2. Standing, Arms Over Head	x	3.5	0.22	152.0	26.1
	y	4.8	0.39	137.0	25.3
	z	28.6	1.33	11.1	1.9
3. Spread Eagle	x	3.3	0.19	151.0	27.1
	y	4.8	0.39	114.0	21.3
	z	28.5	1.90	36.6	7.9
4. Sitting	x	7.9	0.36	61.1	10.3
	y	4.8	0.39	66.6	11.6
	z	26.5	1.14	33.5	5.8
5. Sitting, Forearms Down	x	7.7	0.34	62.4	9.7
	y	4.8	0.39	68.1	12.0
	z	26.8	1.16	33.8	5.9
6. Sitting, Thighs Elevated	x	7.2	0.37	39.1	6.0
	y	4.8	0.39	38.0	5.8
	z	23.1	0.78	26.3	5.1
7. Mercury Configuration	x	7.9	0.34	65.8	10.3
	y	4.8	0.39	75.2	14.0
	z	27.1	1.14	34.2	5.6
8. Relaxed (Weightless)	x	7.3	0.33	92.2	13.3
	y	4.8	0.39	88.2	13.3
	z	27.5	1.44	35.9	5.4

Sample Size 66

Mean Age 33.2 yrs.   S.D. Age 7.2 yrs.

Mean Weight 166.4 lbs. S.D. Weight 19.8 lbs.

Mean Stature 69.4 in. S.D. Stature 2.9 in.

From Santschi, et al. (Ref. 23)

Table 7

Correlation of Moment of Inertia with Stature and Weight of Semi-nude Males in Eight Body Positions

		Axis	$R_{i.sw}$	S.E.*	I_o Regression Equations*	
1.	Standing	x	0.98	4.18	-232.0 + 3.77S	+ 0.512W
		y	0.96	5.27	-212.0 + 3.43S	+ 0.460W
		z	0.93	0.84	-0.604 - 0.098S	+ 0.112W
2.	Standing, Arms Over Head	x	0.98	5.63	-328.0 + 5.36S	+ 0.652W
		y	0.96	6.89	-332.0 + 5.34S	+ 0.589W
		z	0.89	0.87	1.4 - 0.085S	+ 0.094W
3.	Spread Eagle	x	0.98	4.90	-353.0 + 5.63S	+ 0.677W
		y	0.96	6.24	-270.0 + 4.30S	+ 0.516W
		z	0.93	2.82	-101.0 + 1.52S	+ 0.191W
4.	Sitting	x	0.92	4.01	- 91.6 + 1.43S	+ 0.322W
		y	0.92	4.51	-135.0 + 2.26S	+ 0.268W
		z	0.97	1.45	- 52.8 + 0.76S	+ 0.201W
5.	Sitting, Forearms Down	x	0.91	3.98	- 78.7 + 1.29S	+ 0.309W
		y	0.92	4.67	-127.0 + 2.05S	+ 0.321W
		z	0.97	1.36	- 53.7 + 0.765S	+ 0.206W
6.	Sitting, Thighs Elevated	x	0.89	2.79	- 33.8 + 0.543S	+ 0.212W
		y	0.77	3.66	- 22.2 + 0.434S	+ 0.180W
		z	0.92	2.00	- 30.4 + 0.328S	+ 0.204W
7.	Mercury Configuration	x	0.93	3.75	- 94.3 + 1.57S	+ 0.308W
		y	0.94	4.96	-175.0 + 2.85S	+ 0.318W
		z	0.96	1.64	- 45.0 + 0.668S	+ 0.197W
8.	Relaxed (Weightless)	x	0.96	3.71	-106.0 + 1.77S	+ 0.452W
		y	0.94	4.54	-139.0 + 2.43S	+ 0.352W
		z	0.96	1.54	- 47.2 + 0.776S	+ 0.176W

Sample Size 66

r_{sw} = 0.60 S.E. = 2.33 in. S = 54.9 + 0.087W

* I_o and S.E. in lb.in.sec.^{2}

S in in.

W in lb.

From Santschi, et al. (Ref. 23)

Table 8

Centers of Gravity and Moments of Inertia of Semi-Nude and Pressure Suited Males in a Seated Position

	Axis	Center of Gravity (in.)		Moment of Inertia ($lb.in.sec^2$)	
		Mean	S.D.	Mean	S.D.
1. Sitting					
Nude	x	7.89	0.41	56.3	8.22
	y	4.79	0.27	66.5	9.98
	z	9.16	0.29	28.3	5.10
Unpressurized	x	8.33	0.39	67.5	9.16
	y	4.79	0.27	82.8	11.30
	z	9.76	0.30	33.6	5.72
Pressurized	x	8.62	0.38	68.8	8.70
	y	4.79	0.27	82.4	11.30
	z	9.70	0.28	34.0	5.72
2. Relaxed (Weightless)					
Nude	x	7.34	0.38	99.2	14.20
	y	4.79	0.27	89.8	15.20
	z	7.39	0.42	31.2	5.04
Unpressurized	x	7.81	0.30	118.0	15.30
	y	4.79	0.27	114.0	15.0
	z	7.86	0.45	36.2	5.03
Pressurized	x	8.08	0.29	118.0	15.20
	y	4.79	0.27	114.0	15.70
	z	7.81	0.48	36.1	4.85

Mean Age 27.4 yrs. S.D. Age 5.3 yrs.
Mean Weight 164.6 lbs. S.D. Weight 17.4 lbs.
Mean Stature 69.0 in. S.D. Stature 2.3 in.
Mean Clothing Weight 23.2 lbs. S.D. Clothing Weight 0.5 lb.

From DuBois, et al. (Ref. 24)

Table 9

Correlation of Moment of Inertia with Stature and Weight of Semi-nude and Pressure Suited Males in a Seated Position

	Axis	$R_{i.sw}$	S.E.*	I_o Regression Equation*
1. Sitting				
Nude	x	0.95	2.67	-105.0 + 1.59S + 0.317W
	y	0.91	4.07	-135.0 + 2.10S + 0.344W
	z	0.97	1.17	- 70.4 + 0.923S + 0.212W
Unpressurized	x	0.93	3.42	-114.0 + 1.82S + 0.337W
	y	0.97	2.77	-181.0 + 2.96S + 0.362W
	z	0.97	1.47	- 79.5 + 1.09S + 0.229W
Pressurized	x	0.93	3.24	-120.0 + 2.06S + 0.281W
	y	0.94	3.79	-157.0 + 2.54S + 0.389W
	z	0.96	1.53	- 78.1 + 1.07S + 0.230W
2. Relaxed (Weightless)				
Nude	x	0.97	3.30	-191.0 + 2.88S + 0.556W
	y	0.95	4.60	-265.0 + 4.04S + 0.461W
	z	0.94	1.75	- 46.0 + 0.567S + 0.231W
Unpressurized	x	0.95	4.62	-197.0 + 3.19S + 0.574W
	y	0.96	4.38	-217.0 + 3.59S + 0.506W
	z	0.96	1.33	- 54.8 + 0.801S + 0.217W
Pressurized	x	0.97	3.93	-208.0 + 3.42S + 0.550W
	y	0.96	4.44	-254.0 + 4.18S + 0.482W
	z	0.96	1.36	- 48.7 + 0.720S + 0.214W

$r_{sw} = 0.44$ S.E. = 2.02 in.   S = 59.58 + 0.057W

*I_o and S.E. in $lb.in.sec.^2$

S in in.

W in lbs.

From DuBois, et al. (Ref. 24)

Table 10

Tests for Significant Differences Among Moments of Inertia of Semi-Nude, Unpressurized, and Pressurized Males in a Seated Position

	t - Values		
	I_x	I_y	I_z
1. Sitting			
Nude - Unpressurized	3.863*	4.583*	2.967*
Nude - Pressurized	4.424*	4.512*	3.161*
Unpressurized - Pressurized	0.428	0.083	0.184
2. Relaxed (Weightless)			
Nude - Unpressurized	3.750*	4.736*	2.982*
Nude - Pressurized	3.873*	4.639*	2.941*
Unpressurized - Pressurized	0.098	0.022	0.094

*Significant ($t_{0.01} = 2.720$, $t_{0.05} = 2.028$)

From DuBois, et al. (Ref. 24)

Table 11

Anthropometric Data on the Test Sample of Drillis and Contini

Subject	Age (yrs.)	Height (H) (in.)	Height (H) (cm.)	Weight (W) (lbs.)	Weight (W) (kg.)	Body Index C = H W-1/3	Somatotype Classifications
1. M.B.	22	74.00	188.0	193.5	87.77	12.78	4.5 - 4.5 - 4.0
2. T.A.	20	70.00	177.8	187.5	85.05	12.24	5.0 - 4.5 - 2.5
3. K.B.	28	68.25	173.4	179.0	81.19	12.10	5.0 - 4.0 - 2.0
4. F.A.	37	74.0	188.0	165.0	74.84	13.50	2.0 - 4.0 - 6.0
5. R.C.	23	64.75	164.5	162.0	73.48	11.40	5.0 - 5.0 - 1.0
6. D.W.	39	68.75	174.6	160.0	72.57	12.66	4.5 - 4.0 - 2.5
7. H.G.	25	69.75	177.2	153.0	69.40	13.04	4.0 - 4.0 - 3.0
8. A.H.	23	68.00	172.7	152.5	69.17	12.71	4.5 - 3.5 - 2.5
9. A.M.	29	66.0	167.6	152.0	68.95	12.36	3.5 - 5.5 - 1.0
10. C.H.	22	69.50	176.5	151.5	68.72	13.04	4.0 - 4.0 - 3.0
11. R.B.	35	66.25	168.3	147.5	66.90	12.52	3.0 - 5.5 - 1.5
12. N.S.	23	72.00	182.9	139.0	63.05	13.93	2.5 - 3.5 - 5.0
Range	20	64.75	164.5	139.0	63.05	11.40	
	39	74.00	188.0	193.5	87.77	13.93	
Mean Value	27.2	69.27	175.96	161.88	73.42	12.69	
Standard Deviation	6.5	2.83	7.19	16.693	7.572	.661	

Figures 28 and 29 show the cumulative frequency curve for the body height and weight measurements of the selected population based on Hertzberg's data (Ref. 1). It is readily apparent that the height limit of this population varies approximately between 63 and 77 inches. The median is just over 69 inches. The cumulative frequency curve for the weight data for the same population show the weight limits vary approximately between 120 and 230 pounds with the median value of about 160 pounds.

To find the Z coordinate of the center of mass, the subject is placed supine on the board and the scale reading is taken. The principle of moments then gives the coordinates of the center of mass of the system. Since the weight and mass centers of the supporting structures are shown, the subject's mass center can be found by resolution of the loading forces. Again, however, assignment of coordinates of the center of gravity to one posture which were derived from measurements in another position (standing versus supine) must detract from the overall accuracy.

This method has been used by New York University since 1950 (Ref. 26). The torsional table can also serve as a tool for mass center distribution of the whole body. The data obtained by each method are presented in Table 12 and they indicate close agreement.

There are indications that body density displays some temporal changes during the seasons and depends on training progress or regress. The data collected by Boyd (Ref. 27), Brozek (Ref. 28), and others suggest that, in general, the body density tends to increase from birth up to the age of 20 to 27 years. The increase of body density is probably due to growth of the muscular tissues. According to Brozek (Ref. 28), the average density

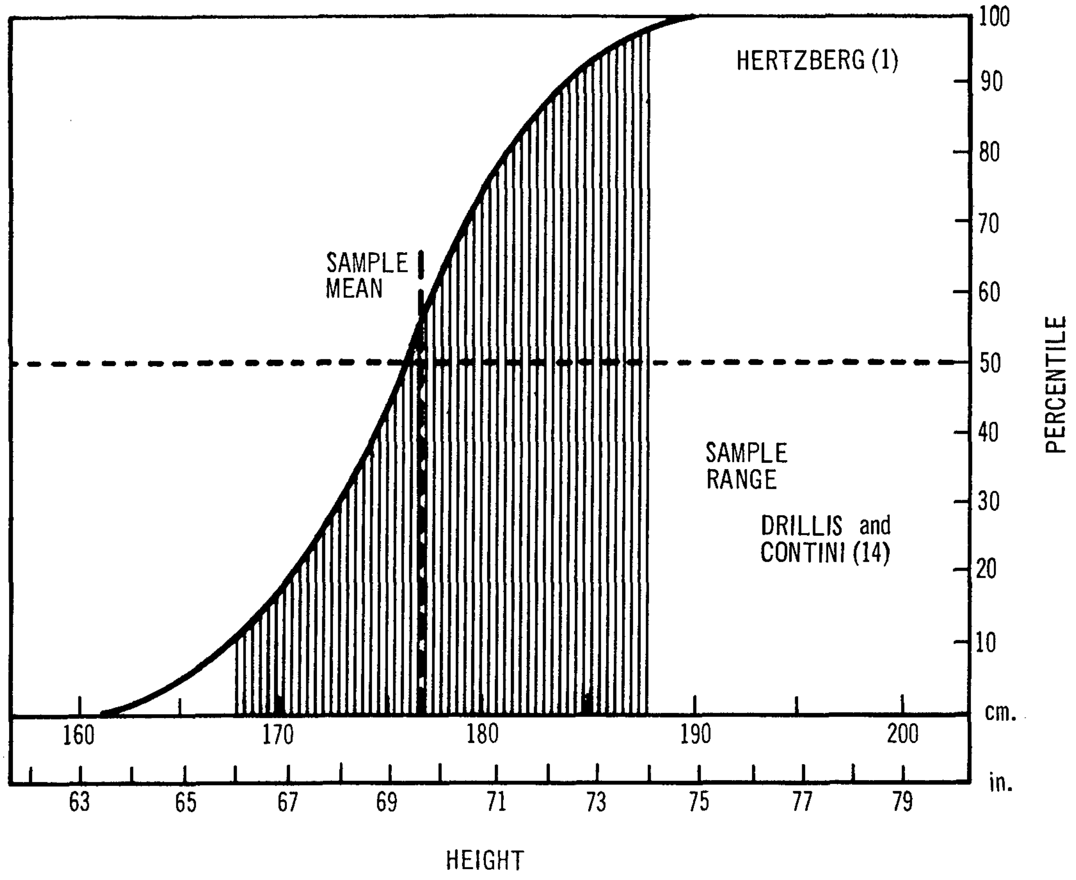


Figure 28. CUMULATIVE DISTRIBUTION OF BODY HEIGHT OF FLYING PERSONNEL COMPARED TO THE TEST SAMPLE OF DRILLIS AND CONTINI

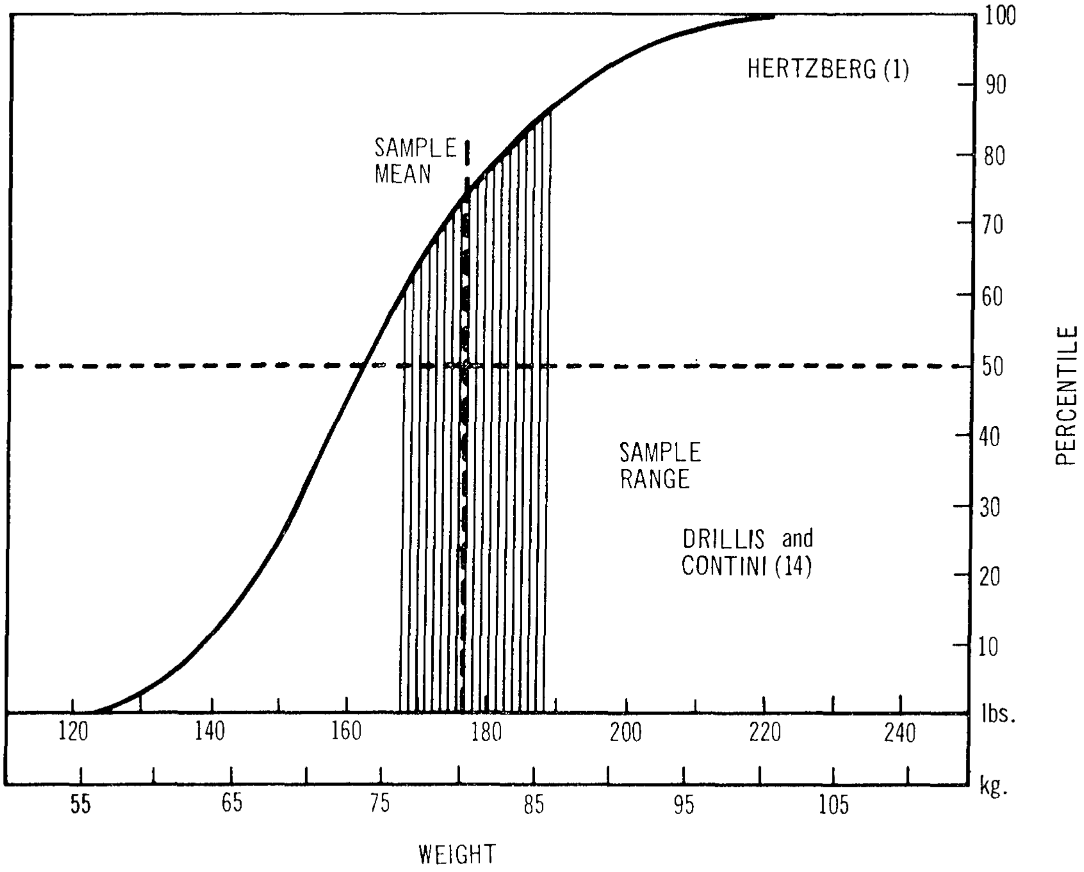


Figure 29. CUMULATIVE DISTRIBUTION OF BODY WEIGHT OF FLYING PERSONNEL COMPARED TO THE TEST SAMPLE OF DRILLIS AND CONTINI

Table 12

Location of the Mass Center of the Whole Body

(In Percentage of Body Height)

Subject		Reaction Board		Torsional Table		Average
T.A.		55.0		55.7		55.35
F.A.		55.8		56.8		56.30
K.B.		57.0		57.9		57.45
M.B.		56.8		55.8		56.30
R.B.		55.1		56.3		55.70
R.C.		56.4		54.7		55.55
H.G.		55.7		55.9		55.80
A.H.		61.9		58.9		60.40
C.Y.H.		59.1		56.1		57.60
A.M.		57.2		57.2		57.20
N.S.		55.9		55.9		55.90
D.W.		55.8		57.5		56.64
Range	from	55.0	from	54.7	from	55.35
	to	61.9	to	58.9	to	60.40
Mean		56.81		56.56		56.68
Standard Deviation		1.95		1.15		1.39

From Drillis and Contini (Ref. 14)

on 153 male subjects shows that there is a decrease from 1.072 at age twenty years to 1.041 at age fifty-five years. The average body density of 62 female subjects indicated a decrease from 1.040 at twenty years to 1.016 at fifty-six. The density decrease, it seems, is due to the increase of the relative mass of body fat tissues.

The density formula developed by the Biomechanics Group of the School of Engineering and Science, New York University, is based on data obtained by A. R. Behnke, et al. (Ref. 29) in 1942. The values of specific gravity were obtained by weighing 99 healthy Naval men under water. The men were in the 20 to 40 year age group and the data were corrected by determination of the residual air volume. The corresponding body indexes of the 99 subjects were determined by the N.Y.U. team from the relationship

$$C = HW^{-1/3}$$

where: C = the body build index

H = the body height in inches

W = the body weight in pounds

The relationship then between the body density and body build can be represented by the linear equation:

$$d = 0.6905 + 0.0297C$$

To save computation time, Fig. 30 presents a nomogram for determination of C. By connecting the subject's height and weight values, there is obtained on the C scale the corresponding body index value. When these are substituted in the density formula, it is possible to determine the subject's approximate body density.

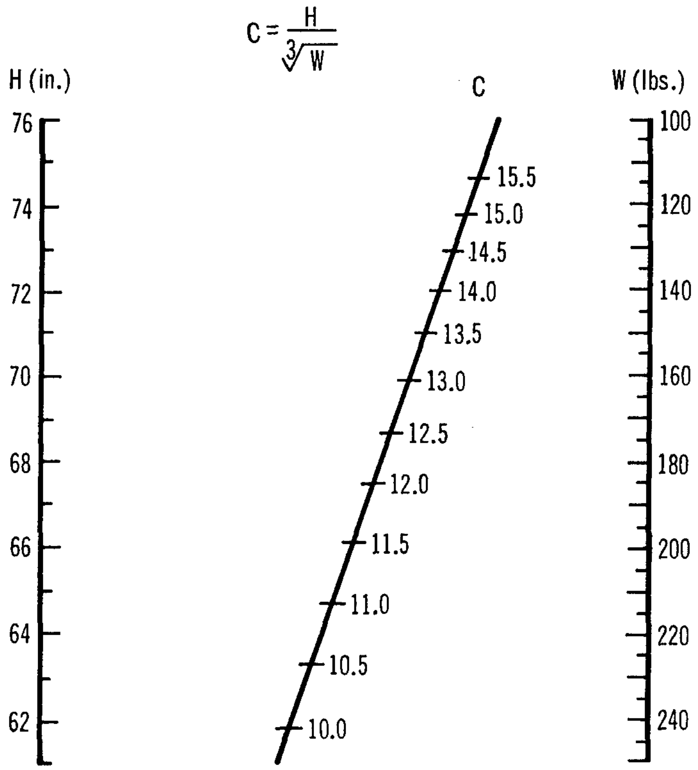


Figure 30. MONOGRAM FOR BODY INDEX (C) DETERMINATION

Table 13 presents the body densities of the test sample of the N.Y.U. study as determined by both the N.Y.U. equation and the Dupertuis equation. The Dupertuis (Ref. 30) equation developed in 1950 expresses body density as a function of Sheldon's (Ref. 31) somatotyping system:

$$d = 1.094 - 0.0119x$$

where x = rate of the first component in Sheldon's somatotyping system.

From the density data and the known body weight, it is possible to determine the volume of the total body. The results also are presented in Table 13. The mean value found by Drillis and Contini (Ref. 14) does not differ significantly from the mean value determined with the Dupertuis Formula but the values of particular subjects do. The maximum difference is 1.73 liters, the minimum 0 liters, the average difference is 0.878 liters or 1.27 percent.

The determination of the whole body density from the known weight and estimated body volume has been suggested by several investigators. The body volume estimation was used by Harless (Ref. 13) a hundred years ago. Formulas based on certain body lengths and circumferences have been developed by Weinbach, et al. (Ref. 32), Bashkirew (Ref. 33), and Skerlj (Ref. 34). However, they are tedious to use and their accuracies are no greater than the Drillis and Contini (Ref. 14) method.

3.1.3.3 Body Segment Parameters

Body segment parameters have been investigated by various investigators including Braune and Fischer (Refs. 18 and 19), Bernstein (Ref. 21), Dempster (Ref. 11), and Drillis and Contini (Ref. 14). Whenver possible, the mass and volume data of Drillis and Contini (Ref. 14) should be used as

Table 13

Total Body Density

Subject	Weight (kg.)	Density Drillis and Contini	Density Dupertuis	Volume in Liters Drillis and Contini	Volume in Liters Dupertuis
1. M.B.	87.770	1.067	1.055	82.26	83.19
2. T.A.	85.050	1.049	1.049	81.08	81.08
3. K.B.	81.190	1.043	1.049	77.84	77.40
4. F.A.	74.840	1.096	1.085	68.28	68.98
5. R.C.	73.480	1.029	1.049	71.41	70.00
6. D.W.	72.570	1.064	1.055	68.20	68.79
7. H.G.	69.400	1.078	1.062	64.38	65.35
8. A.H.	69.170	1.066	1.055	64.89	65.56
9. A.M.	68.950	1.053	1.067	65.48	64.62
10. C.H.	68.720	1.078	1.062	63.75	64.71
11. R.B.	66.900	1.059	1.074	63.17	62.29
12. N.S.	63.050	1.112	1.079	56.70	58.43
Range	63.05	1.029	1.049	56.70	58.43
	87.77	1.112	1.085	82.26	83.19
Mean Value	73.42	1.066	1.062	69.02	69.20
Standard Deviation	7.572	.02475	0.01221	7.83	7.62

From Drillis and Contini (Ref. 14)

the physical characteristics of their subjects are compatible with those of modern day flying personnel (See Table 11). The other studies, while experimentally sound, were performed on cadavers with significantly smaller physical characteristics. In addition, there are questions as to the general applicability of the data due to time lapses, fluid loss, etc., and hence the data may not be entirely comparable to that obtained with living subjects.

There are also the factors of body build, percentile grouping, ethnic origin, and sex which influence the values of these parameters and hence affect their application to other populations. The determination of body segment parameters by Drillis and Contini (Ref. 14) was performed on the same sample used for the whole body parameter determination selected from the N.Y.U. student body and co-workers in the Biomechanics Group. Even so, the conclusions reached by Drillis and Contini (Ref. 14) were that there is no universal agreement on the planes of separation used between adjacent segments. Variations in the major biomechanical parameters will occur depending on the particular determination, for example, as to where the foot ends and shank begins. Even if such a unified and universally accepted subdivision of the human body into its segments could be achieved, it is unobtainable on the living subject.

Body segment volume and mass for any subject depend upon build, occupational activity and his physical (health or pathological) condition. In most cases, some noticeable asymmetry exists between the left and right limbs; however, it is relatively small and practically speaking, it can be neglected. Drillis and Contini (Ref. 14) used a reaction change method to determine masses and mass centers of body segments. Segment volumes

were determined by a combination of immersion and segment zone techniques. Their results of the segment volume determination are presented in Tables 14 through 16.

From Table 14, it is evident that for the upper extremity, the volume of the hand shows the greatest percent variability of the arm due to either muscle or bone formation differences (Ref. 14, p. 51).

In the lower extremity, the thigh shows the greatest variability, which is treat also for the foot. The shank has the least variability. The lower extremity as a whole shows a volume variability 2.5 times greater than the upper extremity. This indicates that the body build differences are more evident in the leg volume data.

To permit comparison of the segment volumes of subjects with different body build, it is customary to express the volume of the segment not in absolute values but as a percent of the total body volume. The data on this test sample are presented in Table 15.

For those subjects whose characteristics tend to be endotype (3 subjects) and those who tend to be ectotype (2 subjects), the segment mass volume data represented as a percentage of the total body volume are shown in Table 16.

The mean values of the body segment mass of the test sample of live subjects are given in Table 17. For comparison the data obtained by Dempster on cadavers are also presented. To enable a comparison of results obtained on different subjects or by various investigators, it is again customary to express the segment mass as a percentage of the total body mass. These

Table 14

Volume of Body Segments in Liters

Segment	Range	Mean	Standard Deviation	C.V. (in Percent)*
Hand	.328 - .428	.384	.035	9.5
Forearm	1.055 - 1.296	1.175	.084	6.5
Upper Arm	2.094 - 3.047	2.412	.334	7.8
Whole Arm	3.512 - 4.583	3.971	.376	6.8
Foot	.670 - 1.105	.895	.175	19.6
Shank	2.263 - 3.272	2.818	.399	14.2
Thigh	4.750 - 8.456	6.378	1.464	22.9
Whole Leg	8.338 - 12.788	10.091	1.758	17.4

*C.V. is the Coefficient of Variability;

$$\frac{100 \times \text{Standard Deviation}}{\text{Mean}}$$

From Drillis and Contini (Ref. 14)

Table 15

Volume of Body Segments Expressed in Percent of the Whole Body

Segment	Range	Mean	Standard Deviation	C.V. in Percent
Hand	.47 - .62	.566	.052	9.60
Forearm	1.47 - 1.72	1.702	.112	6.96
Upper Arm	2.98 - 3.53	3.495	.192	5.87
Whole Arm	4.93 - 5.79	5.73	.299	5.54
Foot	1.04 - 1.35	1.297	0.155	12.53
Shank	3.59 - 4.30	4.083	0.276	7.02
Thigh	6.92 - 10.77	9.241	1.486	16.79
Whole Leg	13.17 - 16.86	14.620	1.599	11.40

From Drillis and Contini (Ref. 14)

Table 16

Mean Body Segment Volume of Endotype and Ectotype Subjects in Percent of Body Volume

Segment	Endotypes (n = 3)	Ectotypes (n = 2)
Hand	0.517	0.623
Forearm	1.538	1.776
Upper Arm	3.426	3.120
Whole Arm	5.481	5.519
Foot	1.184	1.410
Shank	4.100	3.825
Thigh	8.949	6.925
Whole Leg	14.233	12.160

From Drillis and Contini (Ref. 14)

Table 17

Body Segment Masses (in kg.) (Mean Value of the Test Sample)

Segments	Investigators: Dempster 8 Cadavers Age 52 - 83 Years	Investigators: Drillis and Contini 12 Live Subjects Age 20 - 39 Years
Entire Body	59.790	73.420
Entire Upper Extremity	2.976	4.384
Upper Arm	1.575	2.619
Forearm and Hand	1.320	1.765
Forearm	.934	1.324
Hand	.385	.441
Entire Lower Extremity	9.611	11.023
Thigh	5.784	6.946
Shank and Foot	3.609	4.077
Shank	2.737	3.086
Foot	.853	.991

data are in Table 18, which presents the mean values of results obtained by each of the six investigators. To provide further reference information, Drillis and Contini (Ref. 14) presented the grand mean of all investigators; however, this is a straight average of the mean values of all investigators and it ignores the number of subjects each used, and, more important, the sample characteristics. These "mean" values are presented in Tables 19 and 20.

The coefficient method of establishing segment masses is based on the assumption that the ratio of segment mass to whole body mass as established using cadaver measurements can be transferred to live subject segment mass determination. From Table 18 it is evident that these ratios vary from one investigator to another. The ratios obtained by Harless (Ref. 13), Braune and Fischer (Ref. 18), and Dempster (Ref. 11) are based on cadaver measurements. The live subject factors are presented by Meeh (Ref. 17), Bernstein (Ref. 21) and Drillis and Contini (Ref. 14).

In the Drillis and Contini (Ref. 14) tests, the density determination was based on the segment volume determined by combining the immersion and segment zone methods and the mass determined by the reaction change method. Repeated volume determinations showed some variation caused by flow of blood and breathing.

The results of segment density determinations by Harless (Ref. 13), Dempster (Ref. 11), and Drillis and Contini (Ref. 14) are shown in Table 21. Harless has found that:

1. The segment density increases in direction from proximal to distal parts, and

Table 18

Body Segment Weights as Percent of Total Weight
(Mean Values)

Investigator	Body Segment						
	Head, Neck and Trunk	Upper Arms	Lower Arms	Hands	Upper Legs	Lower Legs	Feet
Harless	53.42	6.48	3.62	1.68	22.36	8.78	3.66
Meeh	59.08	6.19	3.38	1.46	17.36	9.35	3.18
Braune and Fisher	49.68	6.72	4.56	1.68	23.16	10.54	3.66
Bernstein	52.98	5.31	3.64	1.41	24.43	9.31	2.92
Dempster	56.50	5.30	3.10	1.20	19.30	9.00	2.80
Drillis and Contini	58.04	7.14	3.60	1.20	18.92	8.40	2.70

Table 19

Average Segment Masses in Percent of the Total Body Mass
(Based on the Mean Value Data of Six Investigators)

Segments	Mass In Percent of the Total Body Mass	C_1*
Head, Neck and Trunk	55.4	
Extremities	44.6	
Upper Extremities	11.3	
Upper Arms	6.2	0.062
Forearms	3.6	0.036
Hands	1.5	0.015
Lower Extremities	33.3	
Thighs	20.9	0.209
Shanks	9.2	0.092
Feet	3.2	0.032

*Ratio of Segment Mass to Whole Body Mass (coefficient).

From Drillis and Contini (Ref. 14)

Table 20

Average Segment Masses of Live Subjects in Percent of the Total Body Mass

(Compared with the Average of Six Investigators)

Investigator:	Bernstein (Russian) 76 Males	Bernstein (Russian) 76 Females	N.Y.U. (U.S.A.) 12 Males	Average of Six Investigators
Segment				
Upper Arms	5.31	5.20	7.14	6.20
Forearms	3.64	3.64	3.60	3.60
Hands	1.41	1.10	1.20	1.50
Thighs	24.43	25.78	18.92	20.90
Shanks	9.31	9.68	8.40	9.20
Feet	2.92	2.58	2.70	3.20

From Drillis and Contini (Ref. 14)

Table 21

Density of Body Segments (in kg/ltr)

Investigator:	Harless	Dempster	Drillis & Contini	
Segment				Average
Hand	1.113	1.170	1.148	1.144
Forearm	1.109	1.130	1.127	1.122
Upper Arm	1.088	1.070	1.086	1.081
Foot	1.089	1.090	1.107	1.100
Shank	1.100	1.090	1.095	1.095
Thigh	1.069	1.050	1.089	1.069
Head and Neck	1.111	1.110	-----	1.111
Trunk	-----	1.030	-----	1.030

Adapted from Drillis and Contini (Ref. 14)

2. there are density differences between the right and left side segments.

On the basis of the N.Y.U. segment density measurements, a third conclusion may be added that the segment density increases with the whole body density.

The segment density change with the body density increase is shown in Figs. 31 and 32. For the upper extremity more measurements were taken and as a result the curves approach more closely the actual densities. For the lower extremity fewer measurements were available and the curves shown are only approximations. Since the techniques for segment density determination of live subjects are in the early stages of development and the total number of measurements is not sufficient for any final statements, the use of the above density data is recommended for approximate segment mass calculations.

For correct determination of segment mass, density and volume of a specific individual direct measurements are a necessity.

The location of the segment mass centers is presented in Tables 22 through 25. Table 24 lists the data of 7 reports; however, the first two reports (Siedell and Guadagnolis (Ref. 55) and Gansler) appear to be reiterations and modifications of Dempster's (Ref. 11) work and hence are omitted from the average values. The last column in Table 24 shows the average value of the last five investigators independent of the number of subjects examined by each investigator.

3.1.3.4 Mass Moments of Inertia

Segment mass moments of inertia can be determined in several ways. A rough estimate can be obtained by the method described by Weinbach (Ref. 32) in

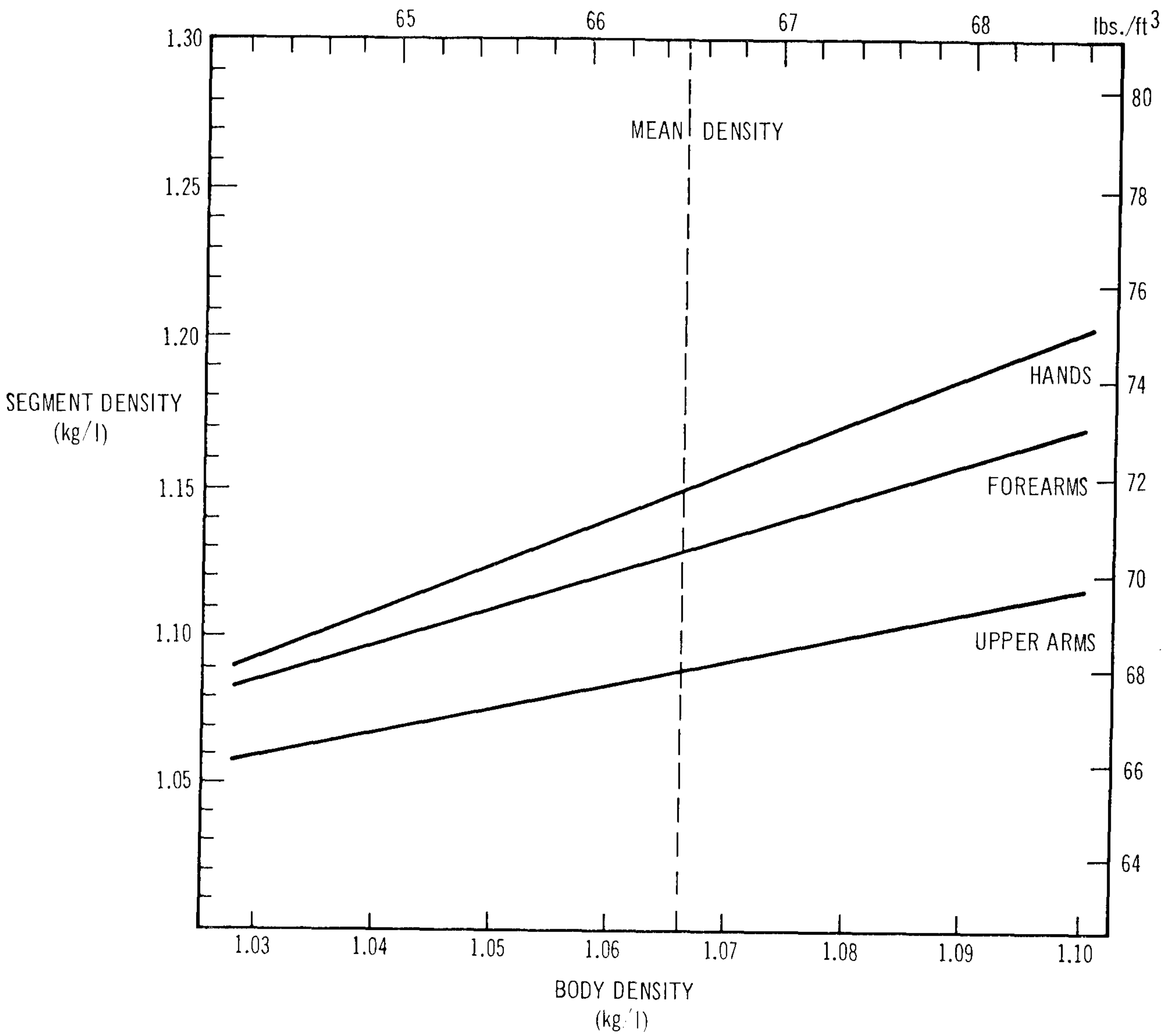


Figure 31. UPPER SEGMENT DENSITY AS A FUNCTION OF TOTAL BODY DENSITY

From Drillis and Contini (Ref. 14)

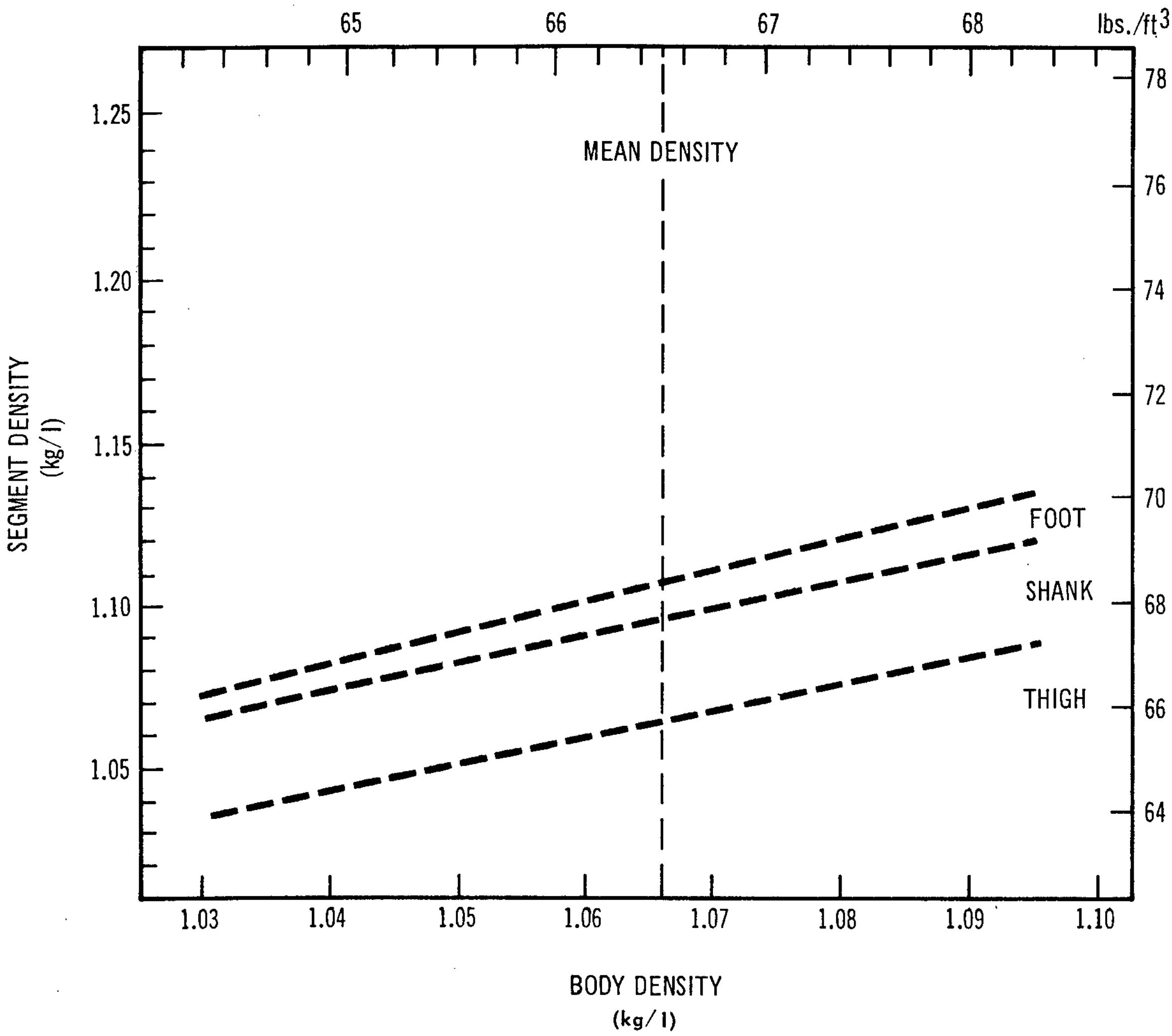


Figure 32. LOWER SEGMENT DENSITY AS A FUNCTION OF TOTAL BODY DENSITY

From Drillis and Contini (Ref. 14)

Table 22.

Location of Segment Mass Centers from Proximal Joints (in meters)

(Mean values of the Drillis and Contini (Ref. 14) Test Samples)

Segments	Determined from Immersion	Determined from Castings
Entire Upper Extremity	0.253	0.250
Upper Arm	0.119	0.113
Forearm and Hand	0.177	0.167
Forearm	0.115	0.110
Hand	-----	0.070
Entire Lower Extremity	0.298	0.319
Thigh	0.146	0.148
Shank and Foot	0.237	0.230
Shank	0.166	0.167
Foot (from heel)	-----	0.118

Table 23

Relative Distances Between Center of Gravity and Joint Axes or Other Handmarks

	Segment or Part and Reference Landmarks	No. Observed	Distance from Center of Gravity Reference Dimension Stated as %
1.	Hand (position of rest) wrist axis to knuckle III	16	50.6% to wrist axis* 49.4% to knuckle III
2.	Forearm, elbow axis to axis	16	43.0% to elbow axis 57.0% to wrist axis
3.	Upper arm, gleno-humeral axis to elbow axis	16	43.6% to gleno-humeral axis 56.4% to elbow axis
4.	Forearm plus hand, elbow axis to ulnar styloid	16	67.7% to elbow axis 32.3% to ulnar styloid
5.	Whole upper limb, gleno-humeral axis to ulnar styloid	16	51.2% to gleno-humeral axis 48.8% to ulnar styloid
6.	Shoulder mass, sternal end of clavicle to gleno-humeral axis	14	84.0% of clavicular link dimension to sternal end of clavicle (oblique) 71.2% of clavicular link dimension to gleno-humeral axis (oblique)
7.	Foot, heel to toe II	16	*24.9% of foot link dimension to ankle axis (oblique) *43.8% of foot link dimension to heel (oblique) *59.4% of foot link dimension to toe II (oblique)
8.**	Lower Leg, knee axis to ankle axis	16	43.3% to knee axis 56.7% to ankle axis
9.**	Thigh, hip axis to knee axis	16	43.3% to hip axis 56.7% to knee axis
10.**	Leg plus foot, knee axis to medial malleolus	16	43.4% to knee axis 56.6% to medial malleolus
11.**	Whole lower limb, hip axis to medial malleolus	16	43.4% to hip axis 56.6% to medial malleolus

*Alternately, a ratio of 42.9 to 57.1 along the heel to toe distance establishes a point above which the center of gravity lies; the latter lies on a line between ankle axis and ball of foot.

**Questioned, sources verified but inspection indicates the same values for all are unlikely.

From Dempster (Ref. 11)

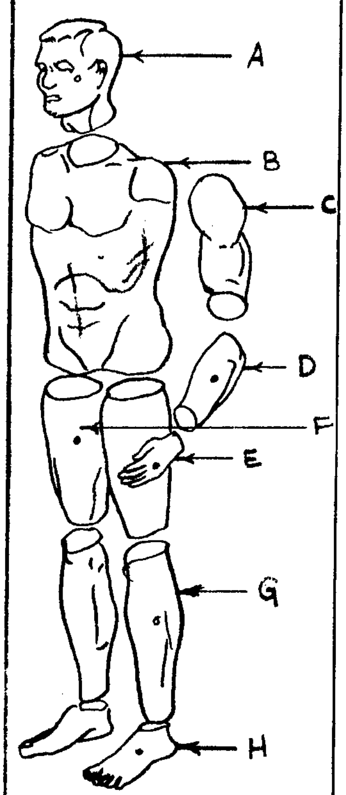
Table 23 (Continued)

	Segment or Part and Reference Landmarks	No. Observed	Distance from Center of Gravity Reference Dimension Stated as %
12.	Head and trunk minus limbs, vertex to transverse line through hip axes	7	60.4% to vertex 39.6% to hip axes
13.	Head and trunk minus limb and shoulders, vertex to line through hip axes	7	64.3% to vertex 35.7% to hip axes
14.	Head and neck, vertex to seventh cervical centrum	6	43.3% to vertex 56.7% to centrum
15.	Thorax, first thoracic to twelfth thoracic centrum	6	62.7% to first thoracic centrum 37.3% to twelfth thoracic centrum
16.	Abdomino-pelvic mass, centrum first lumbar to hip axes	5	59.9% to centrum first lumbar 40.1% to hip axes

Table 24

Location of Mass Centers from Proximal Joints in Percent of Segment Length

	Investigator	Siedell and Guadagnolis ( )	Gansler ( )	Harless (13)	Braune and Fischer (18)	Bechstein (21)	Dempster (11)	Drillis and Contini (14)	Drillis and Contini (14) Avg. Values
A	Head and Neck	51.6							
B	Trunk	42.0							
A, B	Trunk, Head and Neck		60.4						
C, D	Entire Arm							43.1	43.1
C	Upper Arm	43.6	43.6	48.5	47.0	46.6	43.6	44.9	46.1
D	Forearm Arm	43.0	43.0	44.0	42.0	41.2	43.0	42.3	42.5
E	Hand	57.0	50.7	47.4				39.2	43.3
D, E	Forearm and Hand			45.8			67.7*	38.2	42.0
F	Thigh	38.5	43.3	46.7	44.0	38.6	43.3	41.0	42.7
G	Shank	43.3	43.3	36.0	42.0	41.3	43.3	39.3	40.4
H	Foot (from Heel)	58.1		46.0	43.4		43.3	44.5	44.3
F, G	Entire Leg				41.5		43.4	39.7	41.5
G, H	Shank and				51.9		43.3	45.0	46.7



*Distance from elbow to ulnar styloid is assumed to be 100 percent.

Table 25

Distance of Forearm Mass Center from the Proximal Joint. Forearm Length = 1.000

Age	76 Males		76 Females	
	Mean M	Range $\pm\sigma$	Mean M	Range $\pm\sigma$
12-15	0.383	0.359 - 0.407	0.415	0.392 - 0.441
16-25	0.419	0.388 - 0.450	0.417	0.383 - 0.451
26-35	0.409	0.383 - 0.435	0.425	0.388 - 0.462
36-45	0.403	0.384 - 0.422	0.405	0.370 - 0.440
46-75	0.428	0.402 - 0.454	0.411	0.381 - 0.441

Data of Bernstein (Ref. 21) from Drillis and Contini (Ref. 14)

which the coefficients developed by Braune and Fischer (Ref. 18) are used. An approximate estimate of the mass moment of inertia may also be made by determining the segment's volume and using the mean value of the density of the young adult male body. For more accurate determination of the mass moment of inertia of body segments, the compound pendulum method using castings of the appropriate segment under study is recommended as the best (Ref. 14).

The results of tests conducted by Drillis and Contini (Ref. 14) are shown in Table 26 along with similar data obtained by Dempster (Ref. 11). It should be noted that all of the methods discussed assume that the center of mass and the center of volume are coincident. The effect of this assumption is unknown.

By knowing the segment length, segment mass, location of mass center, and segment radius of gyration, it is possible to determine the segment's mass moment of inertia. To obtain the radius of gyration, Braune and Fischer (Ref. 18) suggested the use of a coefficient (C_3). They found that the radius of gyration for rotation about the axis through the mass center and perpendicular to the longitudinal axis of the segment can be established by multiplying the segment's length (ℓ) by the coefficient C_3 (to which they assigned a value 0.3). Hence the mass moment of inertia (I_{cg}) with respect to the mass center would be:

$$I_{cg} = m\rho^{2} = m\ (0.3.\ \ell\ )^{2} = 0.09\ m\ell^{2}$$
$$= m(0.3\rho)^{2} = 0.09\ m\ell^{2}$$

For the rotation of the segment about its longitudinal axis, Fischer established a coefficient $C_4 = 0.35$, so that the radius of gyration

Table 26

Mass Moments of Inertia about the Center of Mass (I_{cg}) of Body Segments

(Mean Values of the Test Samples in gm.n^2)

Segment	Dempster	Drillis and Contini
Entire Upper Extremith	1.05×10^6	1.33×10^6
Upper Arm	0.139×10^6	0.138×10^6
Forearm and Hand	0.187×10^6	0.247×10^6
Forearm	0.055×10^6	0.073×10^6
Hand	0.0045×10^6	0.0059×10^6
Entire Lower Extremity	6.97×10^6	7.49×10^6
Thigh	1.08×10^6	0.895×10^6
Shank and Foot	1.04×10^6	1.120×10^6
Shank	0.416×10^6	0.495×10^6
Foot	0.031×10^6	0.020×10^6

From Drillis and Contini (Ref. 14)

$\rho = 0.35$ D, where D is the diameter of the segment. The approximate values of the segment length expressed as ratios of body height are shown in Fig. 33, as reported by Drillis and Contini (Ref. 14). These values or those values given in Table 2 for BOEMAN-I may be used for approximations for determining the necessary parameters.

Since for a living subject the segment rotates about the proximal or distal joint, and not the mass center, the mass moment of inertia about the joint is greater than I_{cg} by the term me^2, where e is the distance of mass center from the joint. It follows that the mass moment of inertia for segment rotation about the joint is equal to

$$I_j = m\rho^2 + me^2 = m(\rho^2 + e^2)$$

The data obtained experimentally tend not to be in agreement with values obtained by Fischer. The coefficient $C_3 = 0.3$ is generally too high. The apparent error in Fischer's (Ref. 20) value is probably due to the methods used in his second series of tests on which the value is based. In this series of tests two pivots were used at the opposite ends of the segment. This altered the mass configuration of the segment. Furthermore, the added pivot, which in any test would be at a maximum distance from the actual point of rotation (in a pendulum test) would obviously tend to increase the moment of inertia of the combination, and perhaps even have a major influence (Ref. 14). That this probably is a correct inference is shown in Table 28 in which the results of the first series of tests by Braune and Fischer (Ref. 18) vary from the second, and are in keeping with the results obtained by Drillis and Contini (Ref. 14). It is assumed that the Drillis and Contini (Ref. 14) tests based on

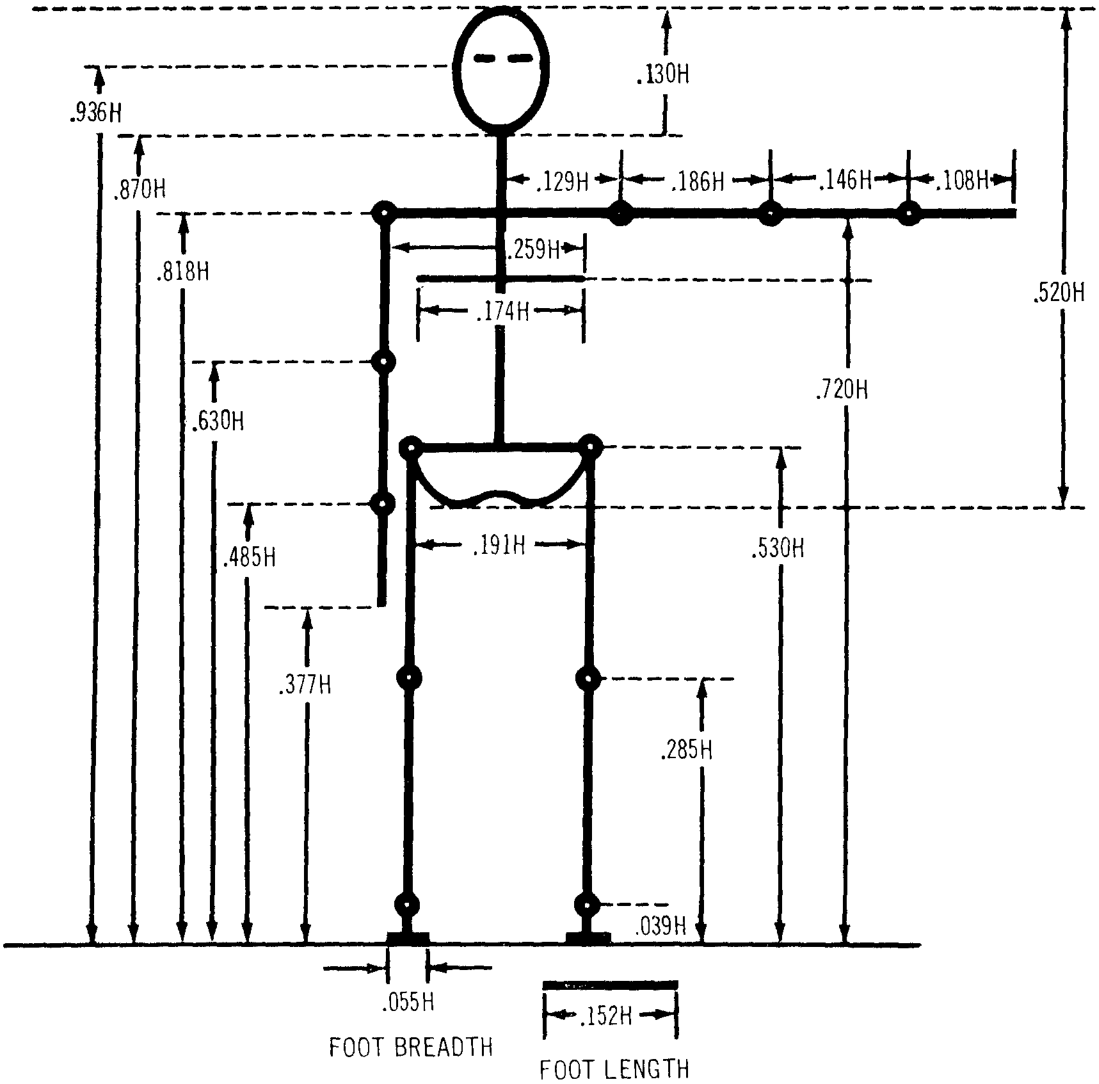


Figure 33. SEGMENT LENGTH EXPRESSED AS A FUNCTION OF BODY HEIGHT

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from Drillis and Contini (Ref. 14)

eight subjects provide better coefficients for the different segments.

3.1.3.5 Sample Computation from Drillis and Contini (Ref. 14)

Assume it is desired to determine the mass, center of mass and mass moment of inertia of the upper arm and forearm and hand (in combination) for a male in this age category.

The following data are required:

(1) The height of the subject

(2) The weight of the subject

The following data are desirable, if obtainable:

(1) Length of the upper arm, and the forearm and hand. (Measure as indicated in Ref. 1).

The following graphs, equations, and tables are used:

(1) Nomogram, Fig. 30 (Body index C)

(2) Graph, Fig. 34 (Whole body density)

(3) Graph, Fig. 31 (Upper extremity density determination)

(4) Table 15 (Volume of the body segments)

(5) Fig. 33 (Segment length, mean)

(6) Table 24 (Location of mass center)

(7) Table 27 (Ratio C_3, radius of gyration)

Procedure

For a subject who weighs 172 pounds and measures 5 feet 11 inches (71 inches) in height, the computations are as follows:

Table 27

Ratio (C_3) of the Radius of Gyration (ρ) to Segment Length (ℓ)

Segment	Braune and Fischer 1 Cadaver Test I		Braune and Fischer 1 Cadaver Test II		Drillis and Contini 8 Live Subjects	Weighted Average
	R	L	R	L		
Entire Upper Extremity			0.30	0.31	0.24	0.252
Upper Arm	0.27	0.27	0.29	0.31	0.26	0.268
Forearm and Hand	0.26	0.28	0.29	0.32	0.25	0.263
Entire Lower Extremity			0.32	0.32	0.24	0.256
Thigh	0.26	0.27	0.31	0.31	0.23	0.250
Shank and Foot	0.32	0.32	0.33	0.35	0.29	0.303
Shank	0.25	0.26	0.24	0.26	0.27	0.264
Average	0.27	0.28	0.30	0.31	0.25	0.265

From Drillis and Contini (Ref. 14)

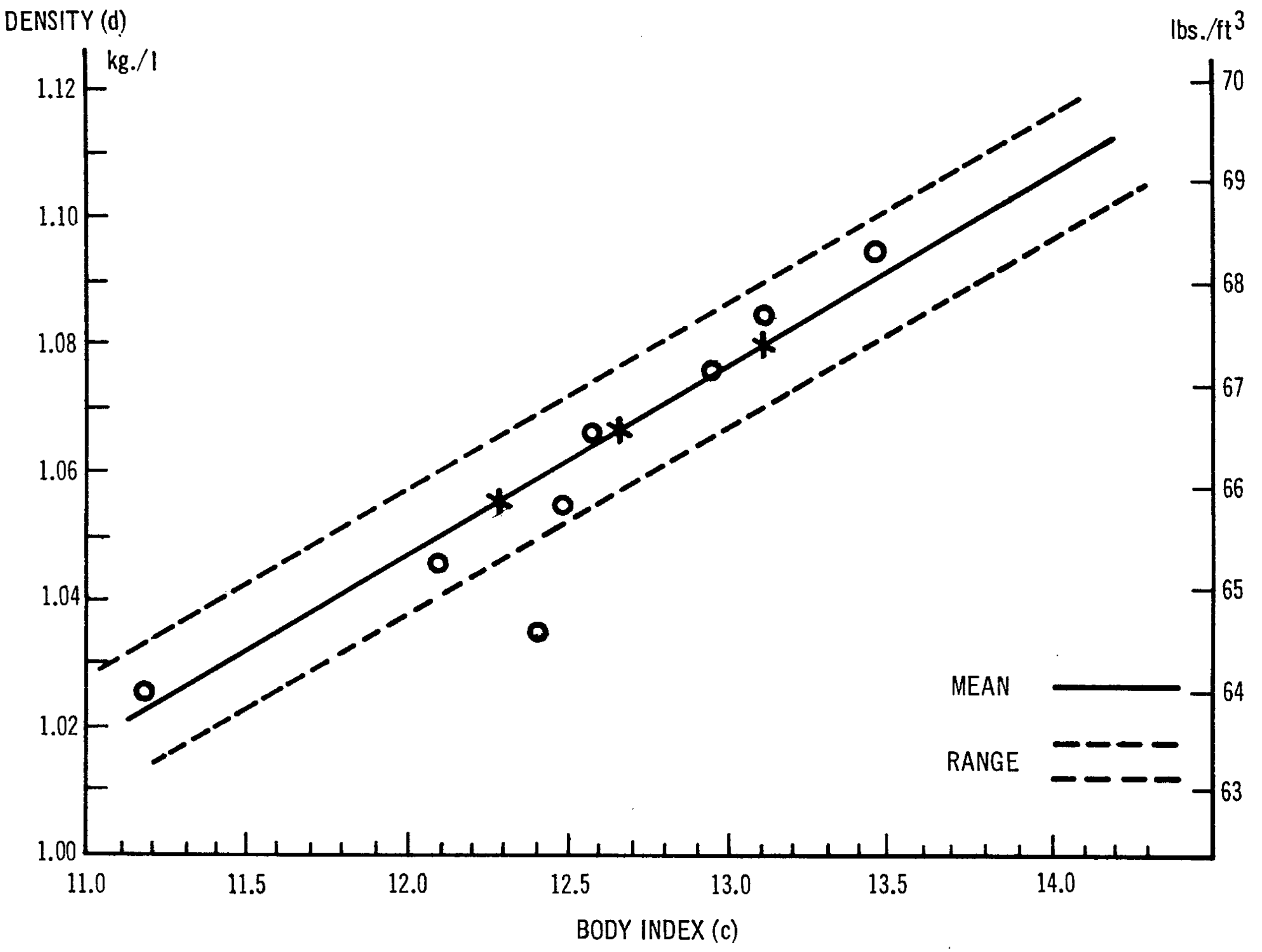


Figure 34. BODY DENSITY AS A FUNCTION OF BODY INDEX (C)

From Drillis and Contini (Ref. 14)

(1) On nomogram, Fig. 30, join the weight in pounds (172) by a line to height in inches (71) and at the intercept with the line for C, obtain a value for C.

$C = 12.9$ approximately

(2) On Graph, Fig. 34, locate $C = 12.9$, proceed vertically upward to intersect solid black line, then proceed horizontally to determine value of the whole body density.

$d - 67.2 \text{ lbs/ft}^3$

(3) On Graph, Fig. 31, proceed as in (2). From $d = 67.2$ vertically upward to intersect lines of segment densities.

d, upper arm $= 68.2 \text{ lbs/ft}^3$

d, forearm $= 71.2 \text{ lbs/ft}^3$

d, hand $= 72.5 \text{ lbs/ft}^3$

(4) Given the weight 172 pounds, whole body density of 67.2 pounds per cubic foot, we can now obtain the whole body volume by dividing the weight by the density:

$172/67.2 = 2.56 \text{ ft}^3$ whole body volume

(5) Table 15 gives the values of the volume of body segments expressed as percentages of the whole body volume:

v, upper arm $= 3.495 \times 10^{-2} \times 2.56 = 0.0895 \text{ ft}^3$

v, forearm $= 1.70 \times 10^{-2} \times 2.56 = 0.0435 \text{ ft}^3$

v, hand $= 0.566 \times 10^{-2} \times 2.56 = 0.0145 \text{ ft}^3$

(6) Multiplying the volumes of the segments by their respective densities, the masses (or weights) of the segments are obtained.

$m\ (w)$ upper arm $= 0.0895\ ft^3 \times 68.2\ lbs/ft^3 = 6.10\ lbs$

$m\ (w)$ forearm $= 0.0435\ ft^3 \times 71.2\ lbs/ft^3 = 3.09\ lbs$

$m\ (w)$ hand $= 0.0145\ ft^3 \times 72.5\ lbs/ft^3 = 1.05\ lbs$

(7) To obtain the approximate lengths of the body segments when they have not been measured, Fig. 33 may be used. From this figure, the mean lengths, expressed in terms of the body height are:

ℓ upper arm $(.818 - .630) = .188\ H$

ℓ forearm $(.630 - .485) = .145\ H$

ℓ hand $(.485 - .377) = .108\ H$

and since $H = 71$ inches

$u = .188 \times 71 = 13.35$ inches

$f = .145 \times 71 = 10.30$ inches

$h = .108 \times 71 = 7.68$ inches

(8) Having obtained the lengths of the segments, the locations of the center of mass (e) can now be determined by using values given in Table 25.

e upper arm $= .461 \times 13.35$ inches $= 6.15$ in

e forearm and hand $= .420\ (10.30 + 7.68) = 7.55$ in

(9) Having the segment lengths, the radius of gyration (ρ) can be determined using values given in Table 27.

ρ upper arm $= 0.268 \times 13.35$ inches $- 3.58$ inches

ρ forearm and hand $= 0.263 \times (10.30 + 7.68) = 4.73$ in.

(10) Since the moment of inertia of any segment about its proximal axis of rotation is expressed by the equation:

$$I_j = m\ (\rho^2 + e^2),$$

we can substitute the values obtained in steps 6, 8, and 9

in the equation. Then,

$$I_j \text{ (upper arm about the shoulder joint)} =$$

$$(6.10 \text{ lbs}) \times \left((\overline{3.58}^{\,2} + \overline{6.15}^{\,2}\right) \text{inches}^2 = 308 \text{ lb.in.}^2$$

$$I_j \text{ (lower arm and hand about the elbow)} =$$

$$(3.09 + 1.05)\text{lbs.} \left((\overline{4.73}^{\,2} + \overline{7.55}^{\,2}\right) \text{inches}^2 = 328 \text{ lb.in.}^2$$

To facilitate computations, Fig. 35 provides a graphic solution for body density (d) based on height and weight. Fig. 36 provides conversion from metric to British systems of measurement, and Figs. 37, 38, and 39 are for determining moments of inertia.

3.1.4 Joint Parameters

3.1.4.1 Joint Characteristics

Joints are formed wherever two or more bones are in juxtaposition. Immovable fibrous joints, like those between the bones of the skull are not interest here. The bones of the movable joints are bound together and sometimes encapsulated by ligaments which are tough, fibrous bands. The types of joints in the limbs include ball and socket in shoulder and hip, hinge for elbow and knee bending, pivot for elbow rotation (hand pronation and supination), and gliding (in part) for the wrist. Spinal joints important to BOEMAN include pivot and gliding for head turning. Joints which secure the shoulder to the sternum are of the gliding type.

The human body is, in the foregoing terminology, an open chain system of links rotating around joint centers. The end members of these open chain links, the hands and feet, can occupy a wide variety of positions in space

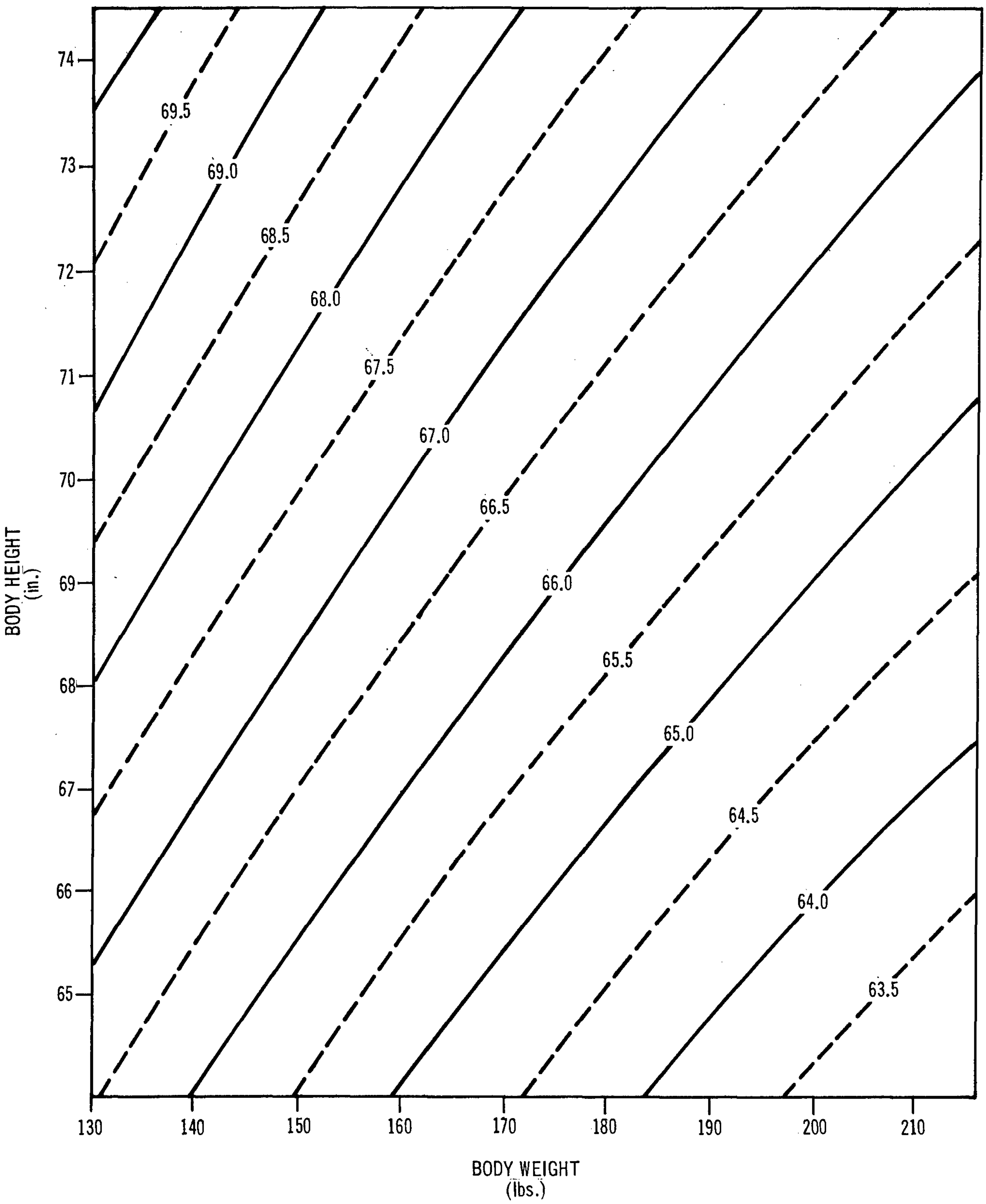


Figure 35. BODY DENSITY AS A FUNCTION OF BODY HEIGHT AND WEIGHT

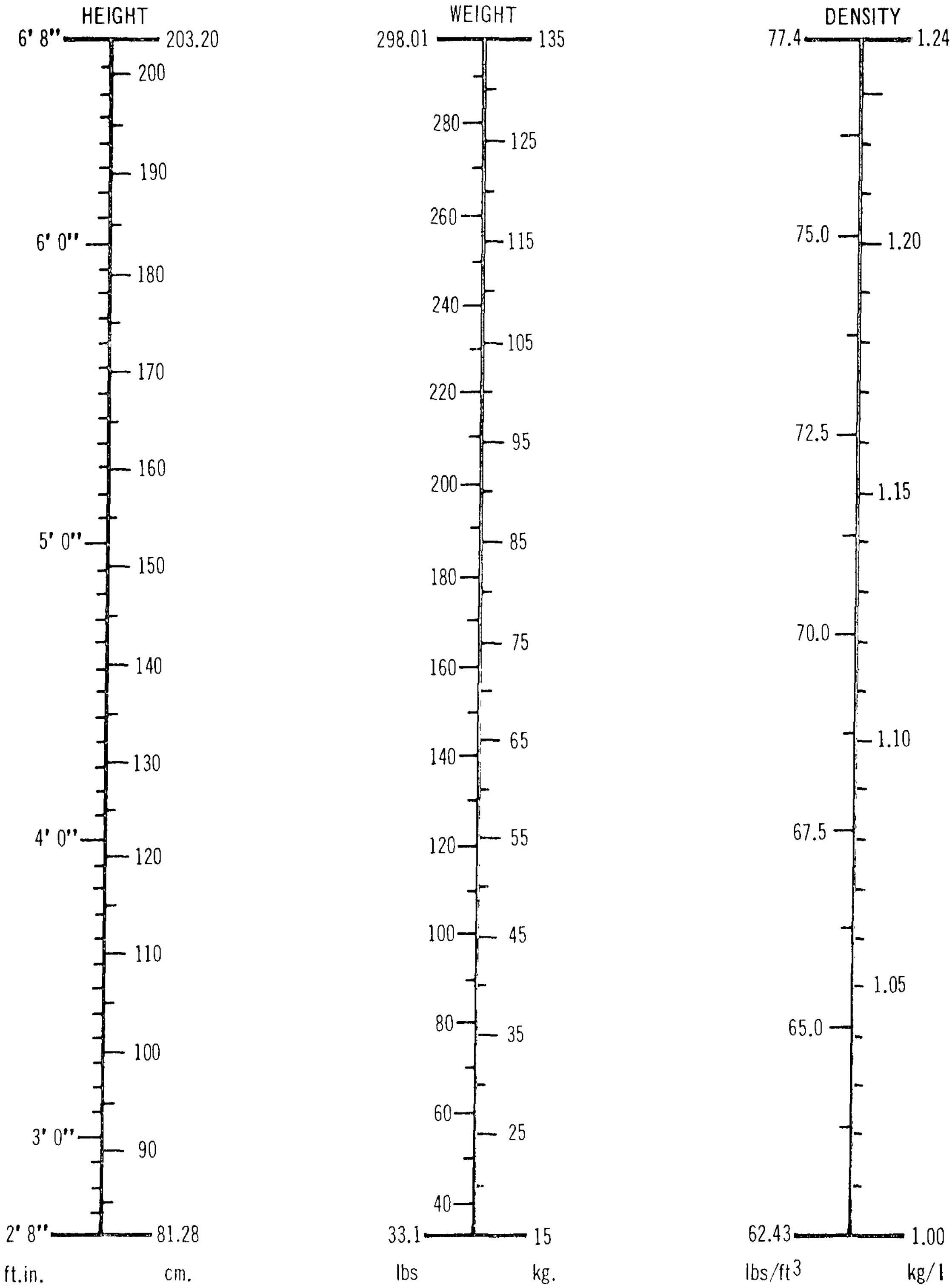


Figure 36. HEIGHT, WEIGHT, DENSITY CONVERSION SCALES

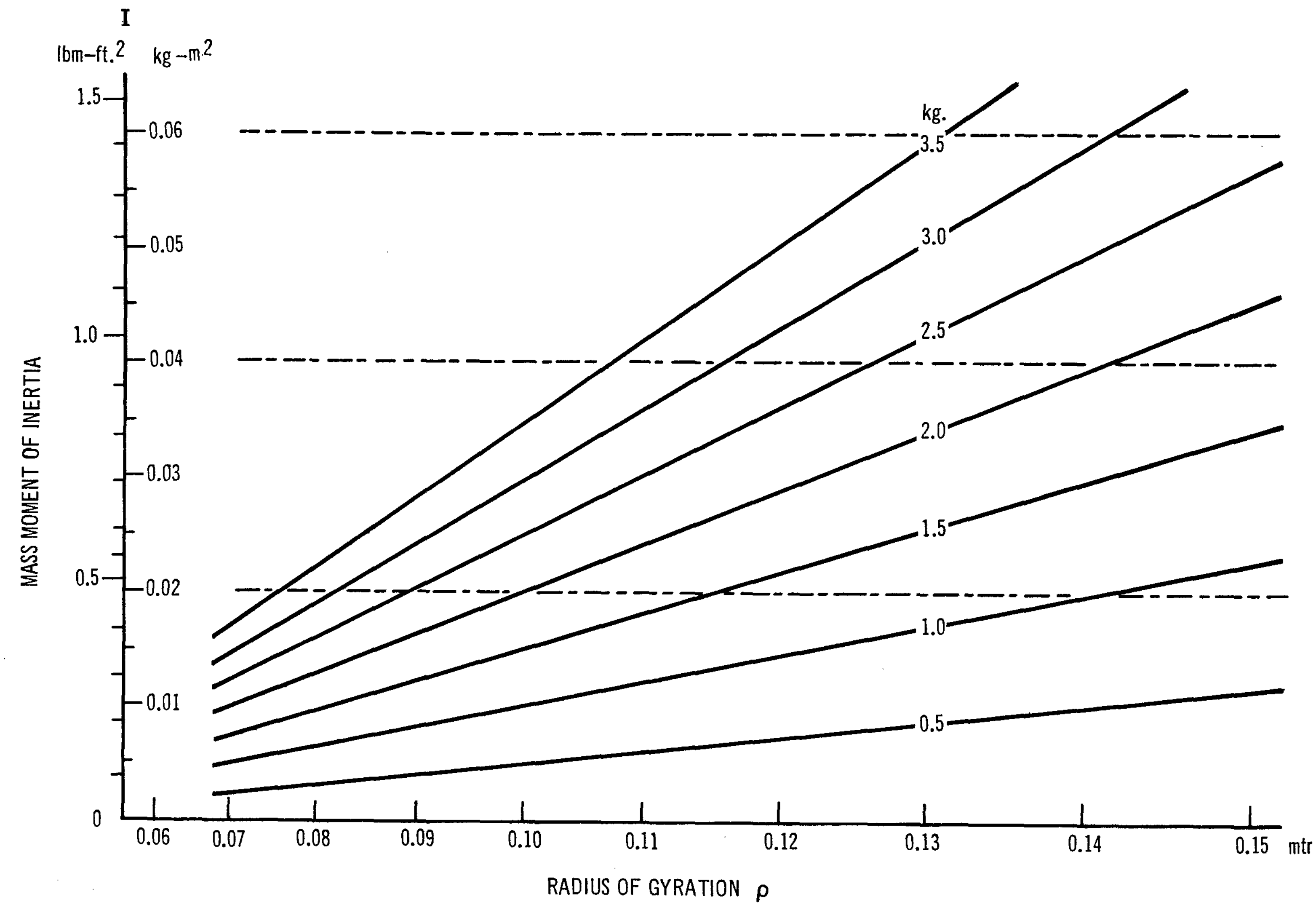


Figure 37. MASS MOMENT OF INERTIA AS A FUNCTION OF SEGMENT WEIGHT AND RADIUS OF GYRATION (LOW RANGE).

From Drillis and Contini (Ref. 14)

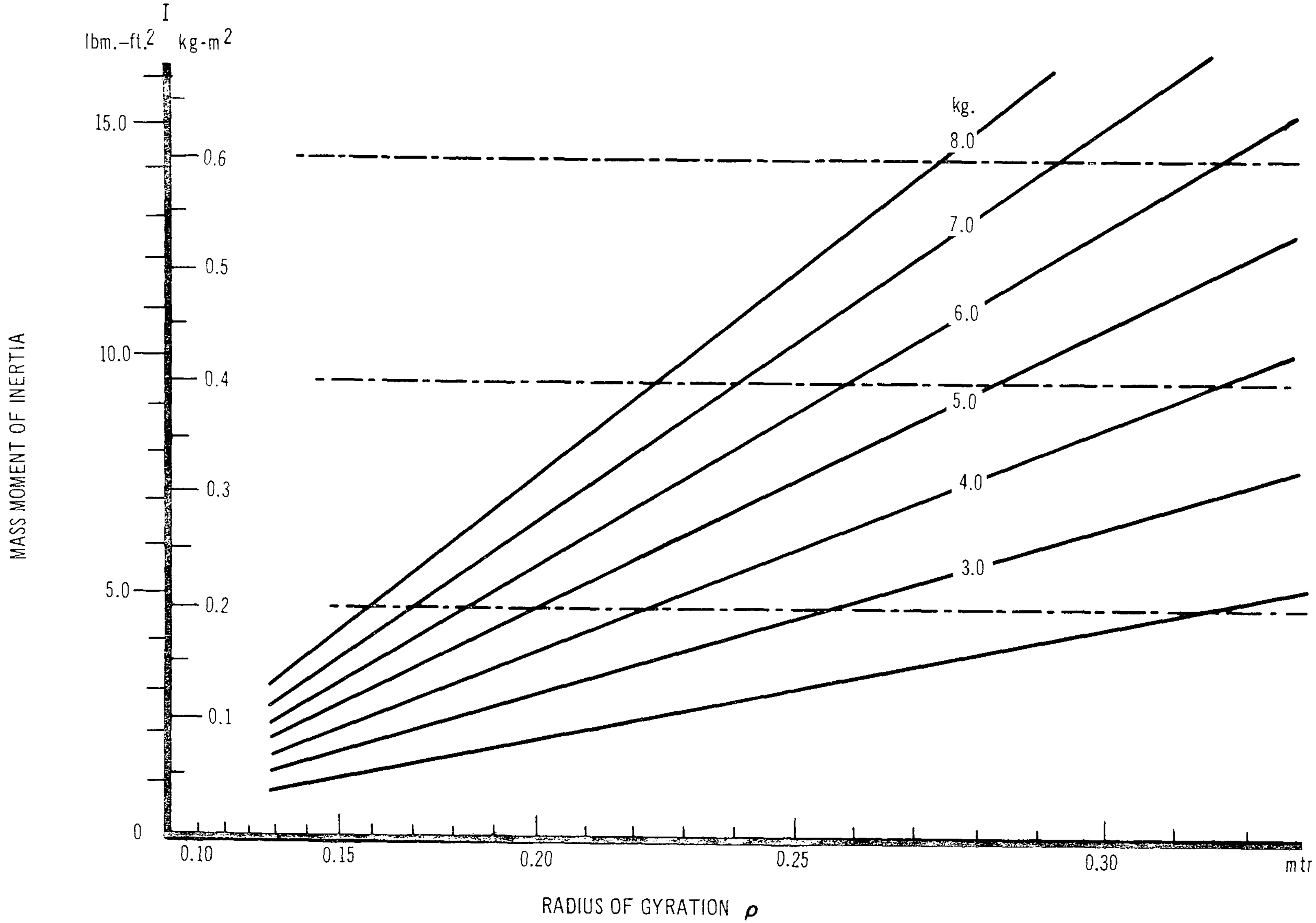


Figure 38. MASS MOMENT OF INERTIA AS A FUNCTION OF SEGMENT WEIGHT AND THE RADIUS OF GYRATION (MEDIUM RANGE)

From Drillis and Contini (Ref. 14)

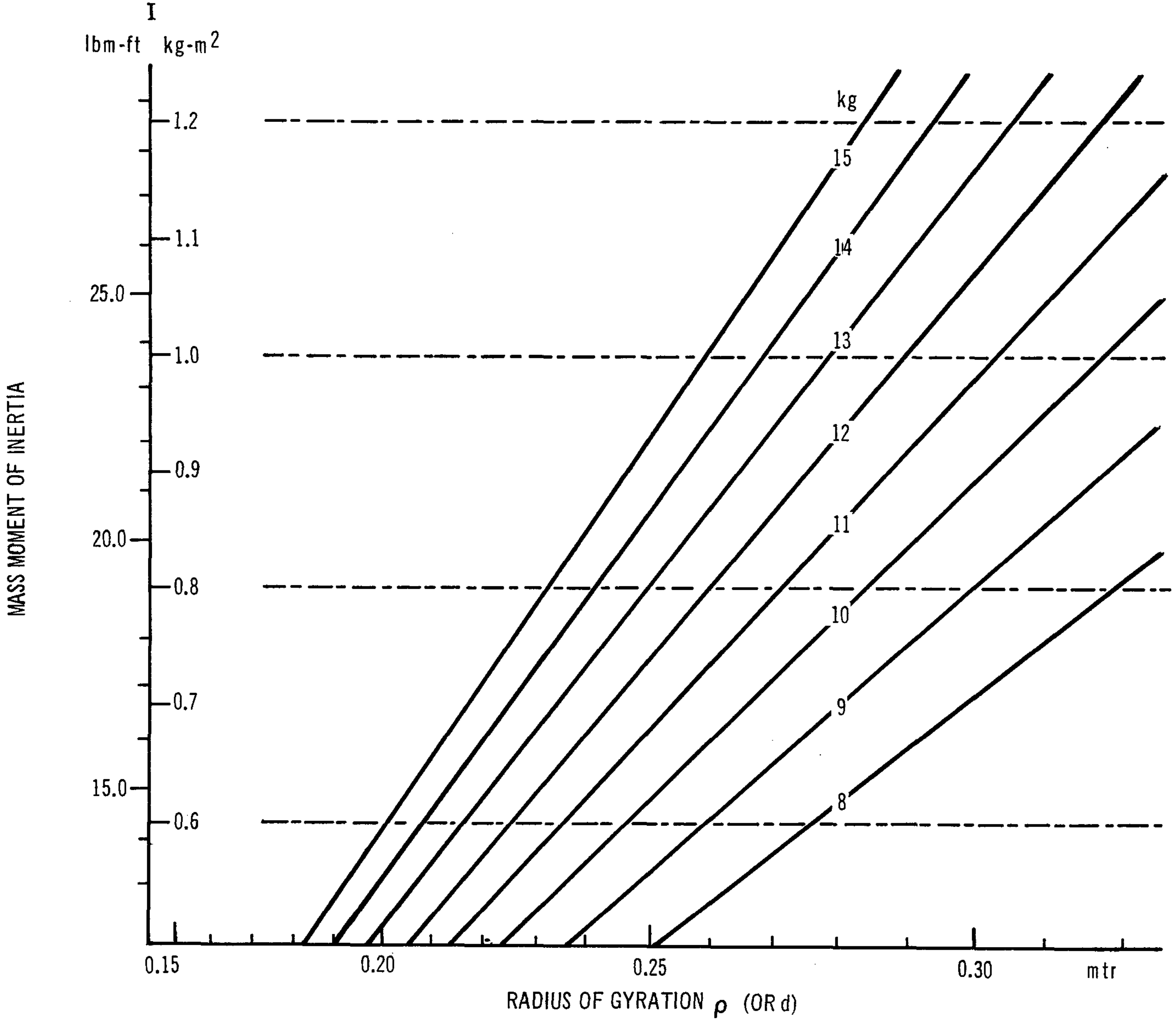


Figure 39. MASS MOMENT OF INERTIA AS A FUNCTION OF SEGMENT WEIGHT AND THE RADIUS OF GYRATION (HIGH RANGE)

From Drillis and Contini (Ref. 14)

as a result of the cumulative ranges of the intervening joints (Dempster, Ref. 11).

3.1.4.2 Joint Angular Limits

The range of joint motion is determined by the bony configuration, constraints imposed by elastic limits of the attached muscles, tendons and ligaments, and the impedance of surrounding tissue, all of which vary somewhat from person to person and joint to joint. Also of importance is the difference between the angular range achieved by voluntary effort and that produced by other forces. Examples of forced limits are: augmented knee flexion when "sitting on one's heels" or twisting one's forearm when the hand is gripping a fixed handle. Factors which are believed to influence the range of joint movement are discussed below.

AGE: Joint mobility decreases only slightly between age 20 and age 60, barring injury, arthritis or other disease. Between the 1st and 7th decades, joint mobility declines about 10 percent, but no significant differences between youth and normal middle age have been found (Ref. 25).

SEX: Women exceed men in the range of movement at all joints but the knee. Differences vary from minor increases to as much as 14 degrees at the wrist (Ref. 25).

RACE: There may be racial differences in joint mobility, but no data are currently available (Ref. 25).

BODY BUILD: Slender men and women have the widest range of joint movements, fat ones the smallest. Average and muscular body builds, in that descending order, are intermediate. These differences

may reach practical significance, especially those between the thin and the fat groups, where variations of more than 10 degrees in a given movement are not uncommon (Ref. 25), although it should be noted that Laubach and McConville (Ref. 53) reported that: "There is a general lack of relationship between flexibility and somatotype components."

EXERCISE: Any joint of the body tends to become restricted in movement if it is not used regularly within the limits of its normal range. Physical exercise may increase the range of motion of a joint. However, excessive exercise can result in the so-called "muscle-bound" condition, which increases bulk and limits joint excursion (Ref. 25).

OCCUPATION: Some specialized tasks involve the repetition of certain body movements. As a result, the range of movement at the affected joints will tend to increase (Ref. 25).

FATIGUE: Severe fatigue will restrict the effective range of joint motion by decreasing not only motivation but muscle strength as well (Ref. 25).

DISEASE: Arthritis, poliomyelitis, and other diseases or injuries affecting the joints, muscles, or nervous system can severely restrict body movements or completely immobilize a joint.

MOTIVATION: Motivation influences the limits of joint motion by determining the effort exerted to attain the maximum amount of movement (Ref. 25).

RIGHT VERSUS LEFT SIDE: There is normally so little variation that the two sides can be considered identical. In arm rotation, for example, group differences between left and right ranged from 0 to 5 degrees (Ref. 25).

BODY POSITION: The range of movement of one part of the body is affected by the position or movement of neighboring parts; thus, hand rotation can be considerably increased if shoulder movements are added to those at the elbow. Wrist flexion is greater with the hand pronated than supinated. In addition, the range of movements in a prone position is not the same as in an erect position.

CLOTHING AND PERSONAL EQUIPMENT: Light clothing has little effect on joint movement, but bulky clothing such as cold-weather or flying gear considerably reduces the range of motion. The Army arctic uniform markedly restricts movements at the neck, shoulder, arm, and waist; crotch-shoulder flexion, for example, is reduced by over 20 degrees (Ref. 25). Joint motion values presented below are for nude or lightly clothed subjects.

Table 28 presents a summary of angular limits to be used for the baseline man-model (BOEMAN-I). Where data were not available, estimations were made (e.g., clavicle). The subsequent tables present more detail on individual movements as reported by various investigators.

Figures 40 and 41 illustrate the terminology and the null reference locations for each of the measurements. The types of body movement are:

FLEXION: Bending, or decreasing the angle of the joint.

EXTENSION: Straightening, or increasing the angle of the joint.

HYPEREXTENSION: The continuation of extension beyond the starting position.

ADDUCTION: Moving toward the midline of the body.

ABDUCTION: Moving away from the midline of the body.

MEDIAL ROTATION: Turning toward the midline of the body.

LATERAL ROTATION: Turning away from the midline of the body.

PRONATION: Rotating the forearm so that the palm faces downward.

SUPINATION: Rotating the forearm so that the palm faces upward.

EVERSION: Turning outward.

INVERSION: Turning inward.

Table 28

Joint Movement Limits (Degrees)

		Mean	S.D.	+2 S.D.	-2 S.D.
1.	Wrist, forced flexion (palmar flexion)	90	12	114	66
2.	Wrist, forced extension (dorsiflexion)	99	13	125	73
3.	Wrist, abduction (ulnar flexion)	47	7	61	33
4.	Wrist, adduction (radial flexion)	27	9	45	9
5.	Wrist, total flexion - extension angle	189	21	231	147
6.	Forearm, supination	113	22	157	69
7.	Forearm, pronation	77	24	125	29
8.	Forearm, total supination - pronation angle	190	30	250	130
9.	Elbow flexion	142	10	162	122
10.	Shoulder, extension	61	14	89	33
11.	Shoulder, flexion	188	12	212	164
12.	Shoulder, total flexion - extension angle	249	19	287	211
13.	Shoulder, adduction	48	9	66	30
14.	Shoulder, abduction	134	17	168	100
15.	Shoulder, total adduction - abduction angle	182	20	222	142
16.	Shoulder, medial rotation	97	22	141	53
17.	Shoulder, lateral rotation	34	13	60	8
18.	Shoulder, total medial - lateral rotation angle	131	24	179	83
19.	Hip, flexion	113	13	139	87
20.	Hip, adduction	31	12	55	7
21.	Hip, abduction	53	12	77	29
22.	Hip, total adduction - abduction angle	84	14	112	56
23.	Hip, medial rotation, prone	39	10	59	19
24.	Hip, lateral rotation, prone	34	10	54	14
25.	Hip, total medial-lateral rotation, prone	73	16	105	41
26.	Hip, medial rotation, sitting	31	9	49	13
27.	Hip, lateral rotation, sitting	30	9	48	12
28.	Hip, total medial-lateral rotation, sitting	61	14	89	33
29.	Knee, voluntary flexion, prone	125	10	145	105
30.	Knee, forced flexion, prone	144	9	162	126

Table 28 (Contd). Joint Movement Limits (Degrees)

		Mean	S.D.	+2 S.D.	-2 S.D.
31.	Knee, voluntary flexion, standing	113	13	139	87
32.	Knee, forced flexion, kneeling	159	9	177	141
33.	Knee, medial rotation	35	12	59	11
34.	Knee, lateral rotation	43	12	67	19
35.	Knee, total medial-lateral rotation angle	78	16	110	46
36.	Ankle, flexion	35	7	49	21
37.	Ankle, extension	38	12	62	14
38.	Ankle, total flexion-extension angle	73	14	101	45
39.	Foot, inversion	24	9	42	6
40.	Foot, eversion	23	7	37	9
41.	Foot, total inversion-eversion angle	47	13	73	21
42.	Grip angle	102	7	116	88
43.	Neck, ventral flexion	67	9	85	49
44.	Neck, dorsal flexion	77	10	97	57
45.	Neck, right or left flexion	41	7	55	27
46.	Neck, rotation - right	73	5	83	63
47.	Neck, rotation - left	74	4	82	66
48.	*Lumbar Joint				
	Ventral and dorsal flexion	10			
	Right and/or left lateral flexion	0			
49.	*Thoracic Joint				
	Ventral flexion	60			
	Dorsal flexion	20			
	Right or left lateral flexion	40			
	Rotation (about thoracic link) CW or CCW	35			
50.	*Eye Deflection (fixational angle)				
	Lateral movement (in transverse plane)				
	Temporal	74			
	Nasal	55			
	Up and down *in sagittal plane)				
	Up	48			
	Down	66			
51.	*Clavicle				
	Elevation	10			
	Depression	10			
	Abduction	10			
	Adduction	10			

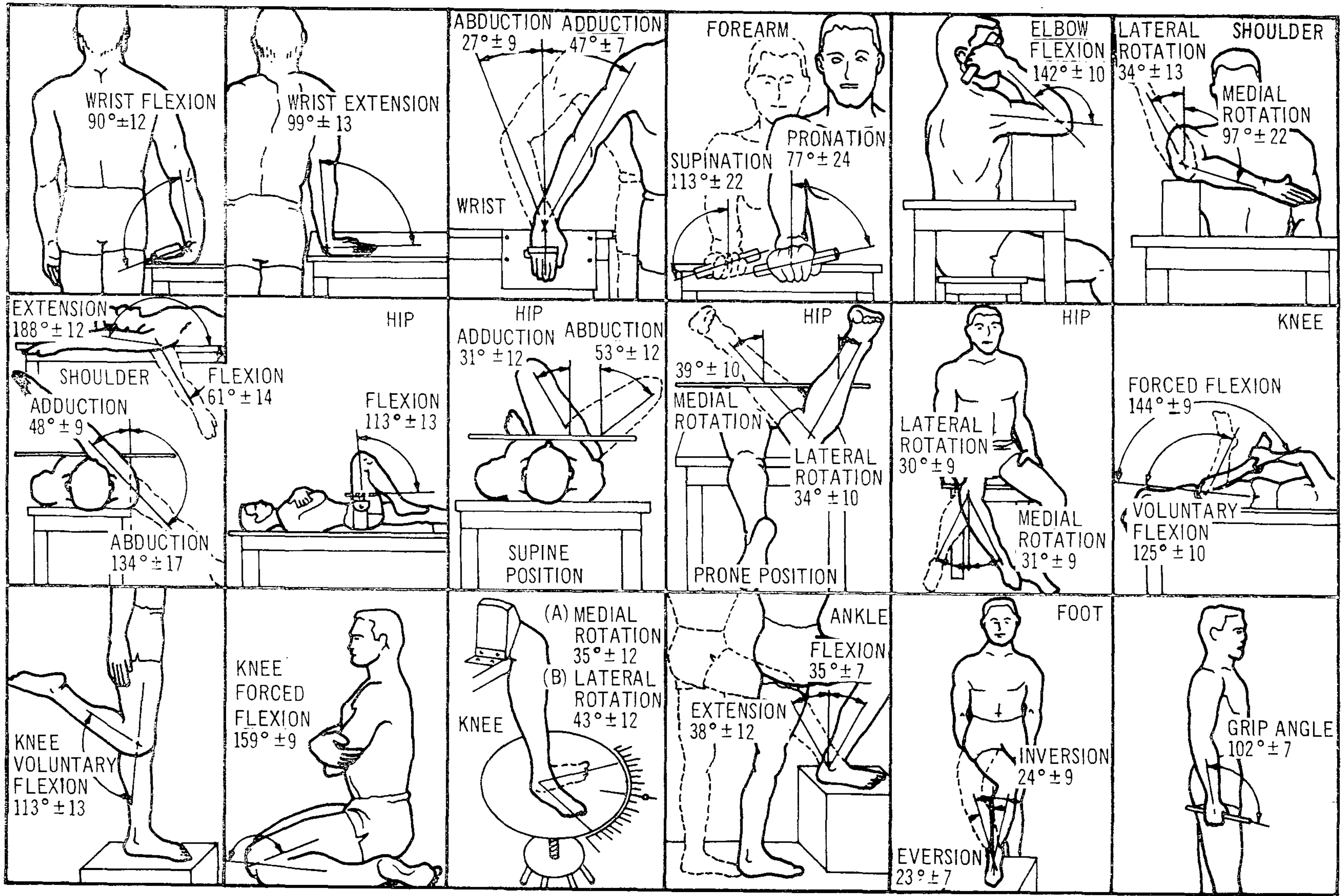


Figure 40. ILLUSTRATION OF THE RANGE OF VARIOUS JOINT MOTIONS

(Ranges of joint motion in 39 young men, showing the median value in degrees, ± 1 standard deviation. If ± 2 SD are taken, 95% of the sample of 39 is included. Compared with the 1950 Air Force survey of over 4000 flying men, this sample is 6.8 years younger, 6.0 lbs heavier, and 1.4 inches taller).

Source: Adapted from analysis by Barter et al. (56) of data from Dempster (11).

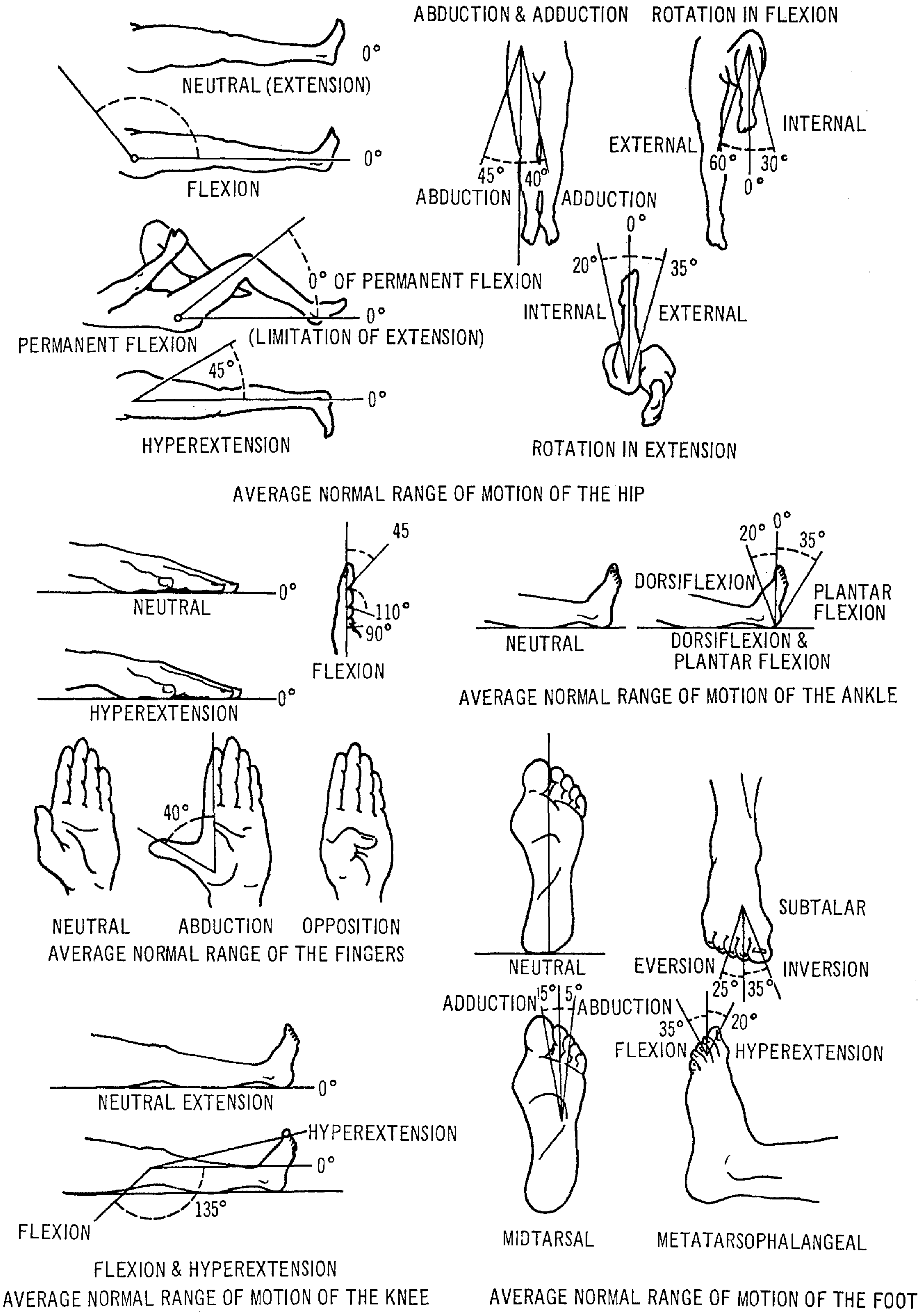


Figure 41. RANGES OF JOINT MOTION

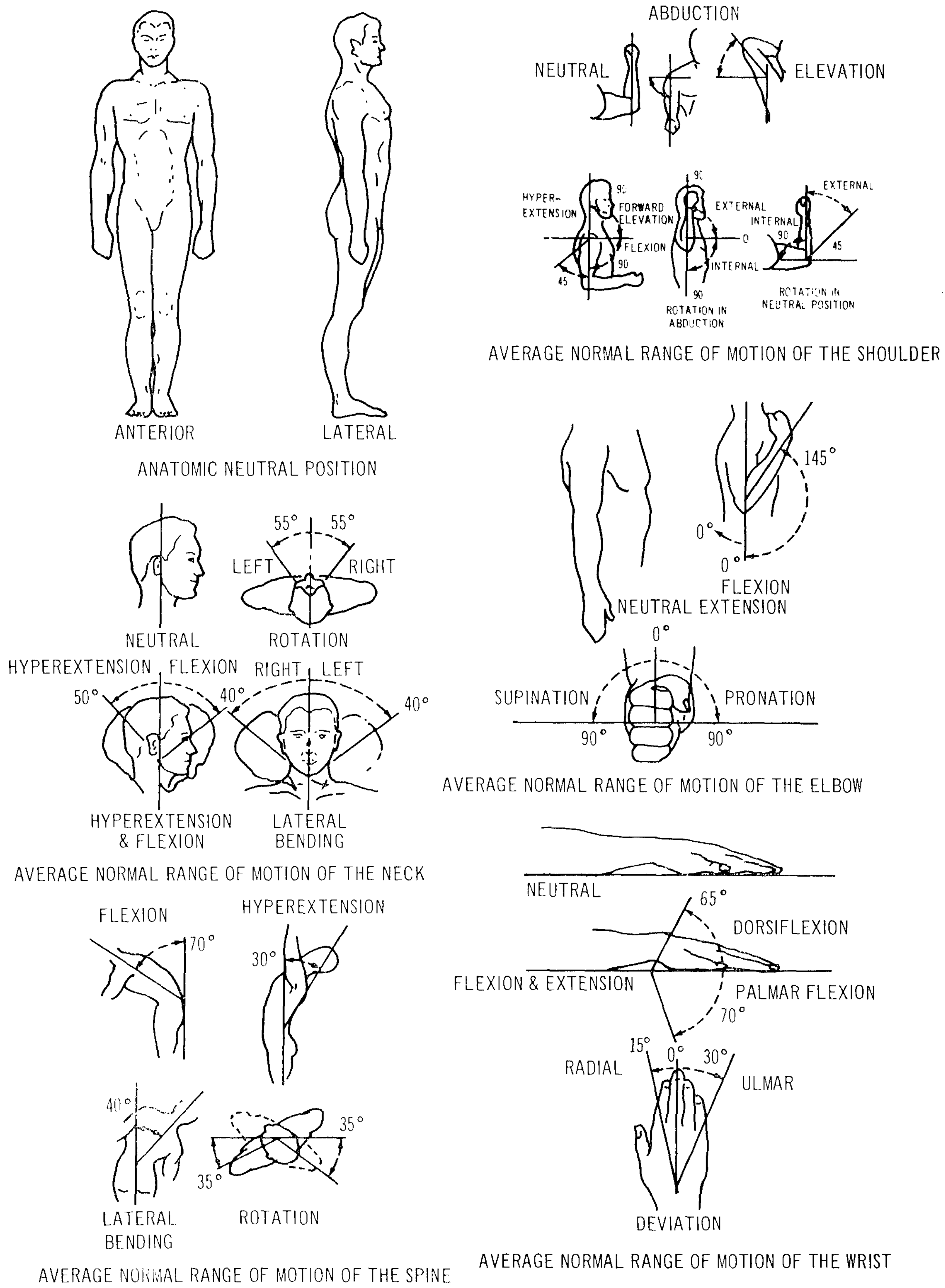


Figure 41. RANGES OF JOINT MOTION (Cont)

Table 29. Range of Movement at the Joints of the Arm and Hand[a]

Joint	Type of Movement[b]	Mean	S.D.	Range of Movement (degrees) 5th Percentile[c]	95th Percentile[c]
Wrist	Flexion[d]	90	12	70	110
	Extension[d]	99	13	78	120
	Total[d]	189	21	154	224
	Adduction[d]	27	9	12	42
	Abduction[d]	47	7	35	59
	Total[d]	74	13	53	95
Forearm	Supination[e]	113	22	77	149
	Pronation[e]	77	24	38	116
	Total[e]	190	30	141	239
Elbow	Flexion	142	10	126	158
Shoulder	Flexion	188	12	168	208
	Extension	61	14	38	84
	Total	249	19	218	280
	Adduction	48	9	33	63
	Abduction	134	17	106	162
	Total	182	20	149	215
	Rotation: medial	97	22	61	133
	Rotation: lateral	34	13	13	55
	Total	131	24	92	170

[a] Barter, Emanuel and Truett (Ref. 56), 39 male subjects representing varied types of body build.

[b] See Figure 40.

[c] Computed from the standard deviation.

[d] These are "forced" movements in that the hand is physically restrained and the forearm then rotated about the wrist joint. Normal movements, in which the hand is rotated about the wrist, would have less excursion.

[e] Elbow at 90 degree angle.

Table 30. Range of Wrist Flexion and Extension While Grasping a Control

Subjects and Test Conditions: 79 male subjects, average age 28 years, representing varied body builds grasped a vertical handgrip located approximately 19 inches forward and 13-1/2 inches above the Seat Reference Point. Sixty-six subjects were used to determine the extreme limits. Flexion and extension of the right wrist were measured from the "neutral" or resting position of the handgrip selected as most comfortable by each subject. This position averaged 19° to the left of a midsagittal (fore-and-aft) plane.

			Range of Movement (Degrees)	
Type of Movement	Mean	S.D.	Percentile[a] 5th	Percentile[a] 95th
Flexion - to left of neutral position				
Comfortable, usable limits	46.0	15.7	20	72
Extreme possible limits	91.0	16.6	64	118
Extension - to right of neutral position				
Comfortable, usable limits	33.6	13.7	11	56
Extreme possible limits	71.8	16.0	46	98
Total movement, extension - flexion				
Comfortable, usable limits	76.6	23.3	38	115
Extreme possible limits	164.2	22.6	127	201

[a] Computed from standard deviation

From Daniels and Hertzberg (Ref. 37)

Table 31. Range of Movement at the Joints of the Leg and Foot[a]

Joint	Type of Movement[b]	Mean	S.D.	Range of Movement (Degrees) 5th Percentile[c]	95th Percentile[c]
Ankle	Flexion	35	7	23	47
	Extension	38	12	18	58
	Total	73	14	50	96
	Adduction (or inversion)	24	9	9	39
	Abduction (or eversion)	23	7	11	35
	Total	47	13	26	68
Knee	Flexion (standing)	113	13	92	134
	Flexion (kneeling)	159	9	144	174
	Flexion (prone)	125	10	109	141
	Rotation: Medial	35	12	15	55
	Rotation: Lateral	43	12	23	63
	Total	78	16	52	104
Hip	Flexion	113	13	92	134
	Adduction	31	12	11	51
	Abduction	53	12	33	73
	Total	84	14	61	107
	Rotation: Medial (seated)	31	9	16	46
	Rotation: Lateral (seated)	30	9	15	45
	Total	61	14	38	84
	Rotation: Medial (prone)	39	10	23	55
	Rotation: Lateral (prone)	34	10	18	50
	Total	73	16	47	99

[a]Barter, Emanuel and Truett (Ref. 56), 1957: 39 male subjects representing varied types of body build.

[b]See Figure 40.

[c]Computed from standard deviation

Table 32. Range of Movement at the Neck

Type of Movement[a]	Range of Movement (Degrees)	
	Mean	S.D.
Flexion (ventral)[b]	60	12
Flexion (ventral)[c]	67	9
Flexion (dorsal)[b]	61	27
Flexion (dorsal)[c]	77	10
Flexion (right or left)[b]	41	7
Rotation (right or left)[b]	79	14
Rotation (right)[c]	73	5
Rotation (left)[c]	74	4

[a]See Figure 41

[b]Glanville and Kreezer (Ref. 38), 10 male subjects.

[c]Buck et al., (Ref. 39), 100 subjects, 47 males, 53 females.

Table 33. Difference in Range of Joint Motion in Men and Women[a]

Joint	Type of Movement	Mean Difference (Degrees)[b]
Wrist	Flexion - extension	+14
	Adduction-abduction	+11
Elbow	Flexion-extension	+ 8
Shoulder	Abduction (rearward)	+ 2
Ankle	Flexion-extension	+ 4
Knee	Flexion-extension	0
Hip	Flexion	+ 3

[a]Sinelnikoff and Grigorowitsch (Ref. 40), 100 male and 100 female subjects.

[b]"Plus" (+) denotes greater range in women.

3.1.5 Visual Characteristics

The subject of vision has received a great deal of attention from researchers for a number of years and the literature is abundant with data. It is the task of this report to determine that data which are applicable and necessary for the computerized man-model without complicating the subject any more than necessary. Therefore, it was felt that a description of the field of vision in mathematical data terms which have considered the more important limitations and influences would be a practical approach.

The eye is a complex entity in itself; however, with regard to the computerized man-model, the retina, fovea, rods, and cones are most important. The retina is the innermost layer of the eyeball which is the receiving apparatus for a light stimulus. The fovea is a small pit at the center of the retina where photopic vision is best. The rods and cones are light sensitive neural receptors in the retina named for their general shape. The cones are concentrated in the region of the fovea and are highly sensitive to color and form. They function best at high levels of illumination and are relatively insensitive to low levels. The rods starting at the outer edges of the fovea increase in concentration through the region surrounding the fovea and completely predominate over the cones toward the extreme periphery of the retina. The rods are much more sensitive to light than cones and are relatively insensitive to form and color. Figures 42 and 43 help to illustrate these points.

The ability to observe and identify an object then depends in part on what part of the retina the image falls. In practical problems, therefore, it is

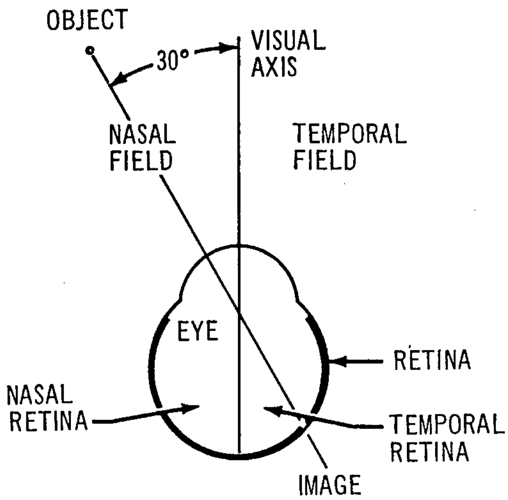
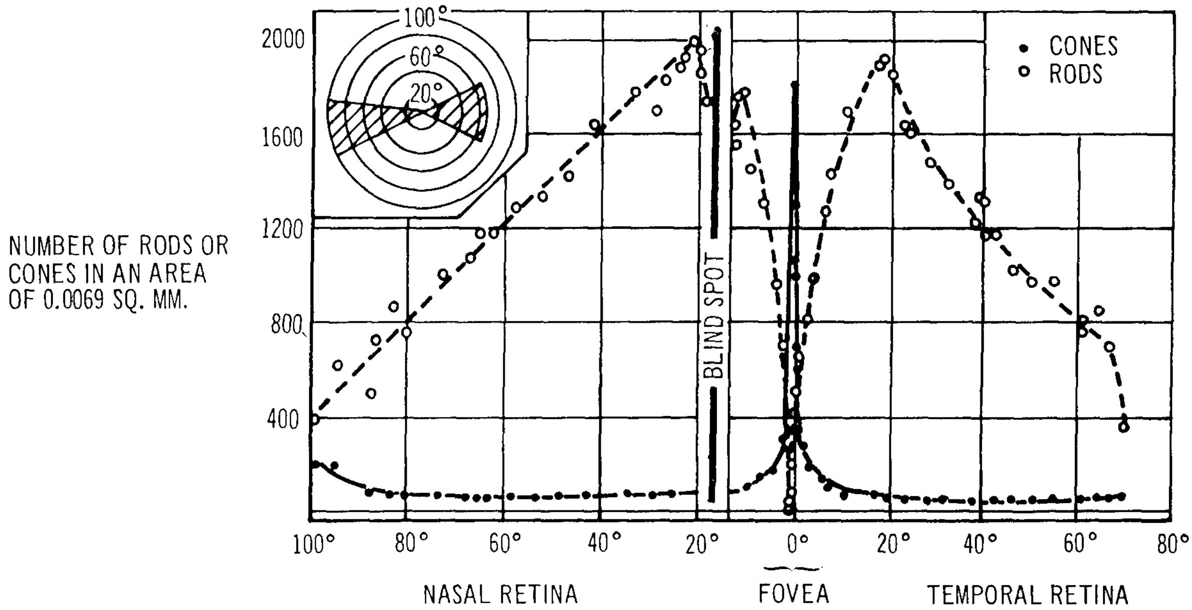


Figure 42. EYE IMAGES

Diagram Showing How Object on One Side of Visual Field Produces Image on the Other Side of the Retina (Right Eye is Shown).

From Wulfeck et al. (Ref. 41)



The density of cones and rods on or near the horizontal meridian through a human retina. The inset is a schematic map of the retina showing F, the fovia, and B, the blind spot. The striped area represents the regions of the retina which were sampled in obtaining the counts plotted here (from Ref. 42).

Figure 43. DISTRIBUTION OF THE RODS AND CONES IN THE HUMAN RETINA

From Wulfeck et al. (Ref. 41) data of Osterberg (Ref. 42)

essential to consider where the object will fall on the retina (see Fig. 42). It is true that vision is also a function of illumination, color, brightness contrast, size, visual angle, display time and others, but these factors are presently considered in cockpit designs and should not be critical to the computerized man-model. Some assumptions are necessary, however. For example, we have assumed that all things observed are black, gray or white, thereby eliminating the color restrictions as shown in Fig. 44.

The visual field is defined as the spatial area, in degrees, which can be seen by the fixated eye. The combined horizontal field extends through an arc of approximately 188 degrees and the monocular field is approximately 156 degrees. The binocular or overlapping field is approximately 124 degrees. The vertical field is 46 degrees up from the line of fixation and 67 degrees down (Ref. 41). Figures 45 and 46 help to illustrate these points.

Brightness contrast is a measure of how much target brightness (B_t) differs from the background brightness (B_b). The equation for obtaining brightness contrast is:

$$\text{Percent contrast} = \frac{B_b - B_t}{B_b} \times 100$$

Contrasts can vary from 100% to zero for targets darker than their backgrounds and from zero to infinity for targets brighter than their backgrounds. With less contrast, there is lower acuity. For example, it is harder to see black on gray than it is to see black on white.

COLOR ZONES: The color of a stimulus varies with its position in the visual field and with its intensity. Various color zones for the right eye are shown on the map as seen with indirect vision in different parts of the retina. Red and green colors have relatively small fields in the central region of the retina, while blue and yellow have the largest fields. Beyond these only gray can be seen. The crosshatched area indicates the area where nothing is seen. (Kennedy, Ref. 43, and Morgan and Stellar, Ref. 44: data from Boring, Langfeld and Weld, Ref. 45).

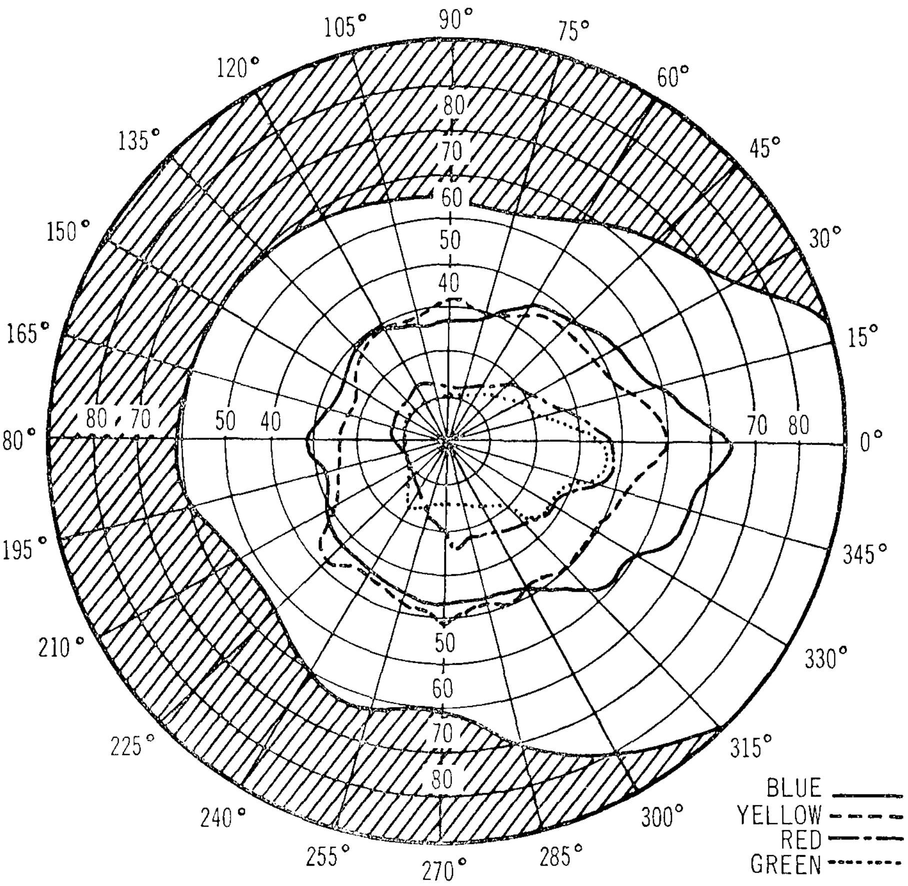
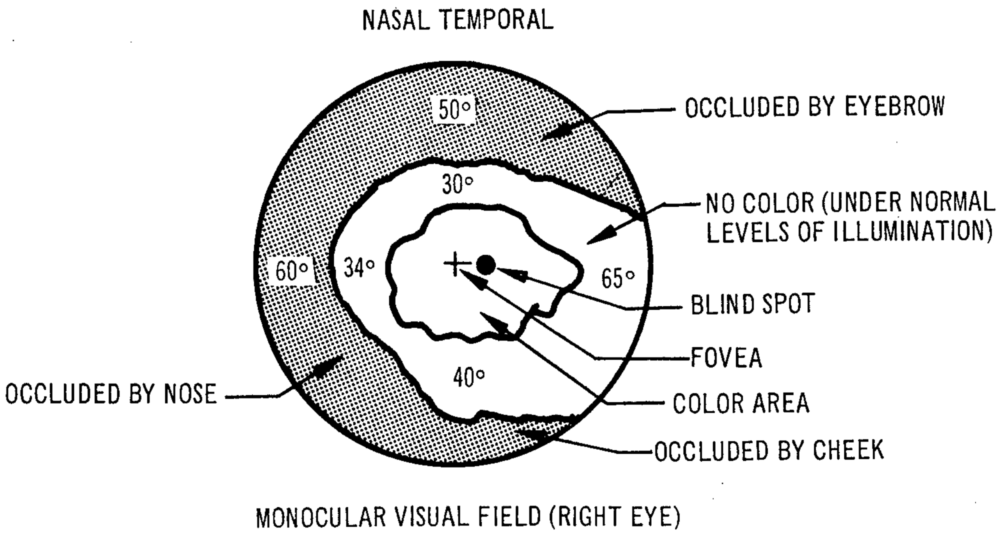


Figure 44. COLOR ZONES OF THE HUMAN EYE



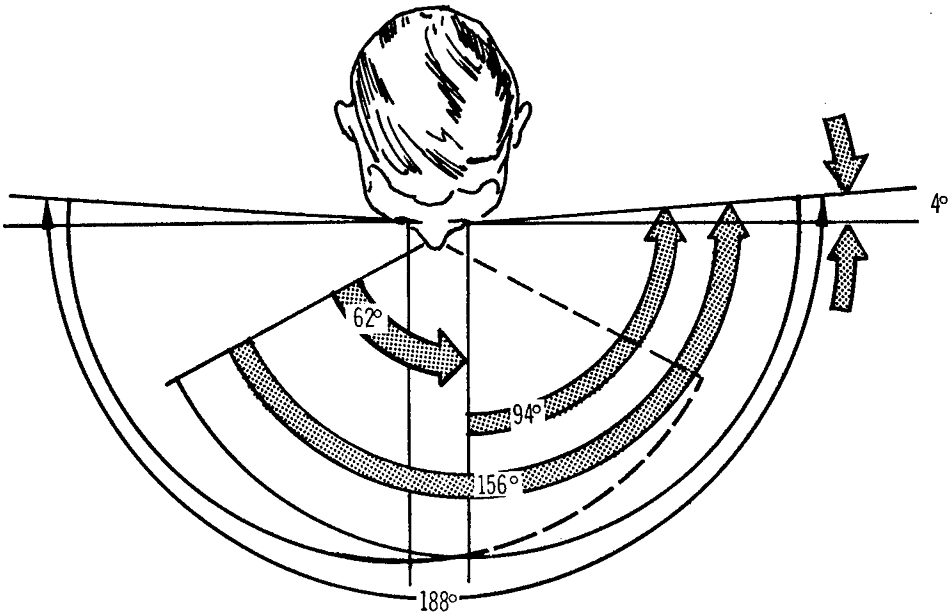


Figure 45. APPROXIMATE HORIZONTAL VISUAL FIELD

From Allen (Ref. 57)

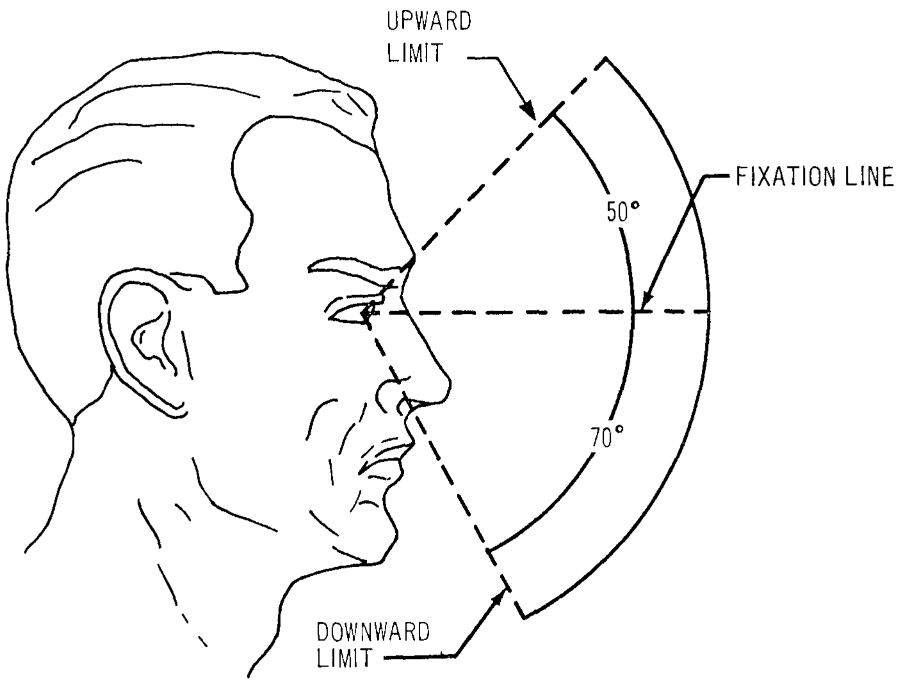


Figure 46. APPROXIMATE VERTICAL VISUAL FIELD

When a person is looking directly at a point, he is using his foveal, or central, vision. He is said to be fixating the point, and the point may be considered a fixation point. The fixation point lies on the visual axis, or line of sight; this point and any other object on the visual axis appears at the exact center of the visual field. The position of any other point in the visual field can then be given as an angle between the visual axis and a line between that point and the eye. This angle is the eccentricity angle - the angle by which the point is off-center in the visual field.

The eccentricity angle, then, indicates the distance of any point in the visual field from the center. On charts of the visual field, circles of equal eccentricity are generally drawn about the fixation point as guides (see Fig. 47).

For precisely specifying the direction of a point from the center of the visual field, a reference radius is arbitrarily designated as zero degrees. The direction of a point in the visual field can then be given as the angle between the reference radius and a line connecting the point and the center of the visual field. It is customary to provide equally spaced radial reference lines on charts of the visual field (see Fig. 47). The line selected as the zero-degree reference radius varies with different charts.

To locate a point in the visual field, then, we specify its eccentricity and its direction in degrees. For example, point A in Fig. 47 lies 20 degrees out in the field and 300 degrees from the reference radius. Point B lies 40 degrees out and 150 degrees from the reference radius (or 30 degrees above the horizontal in the upper left quadrant of the field).

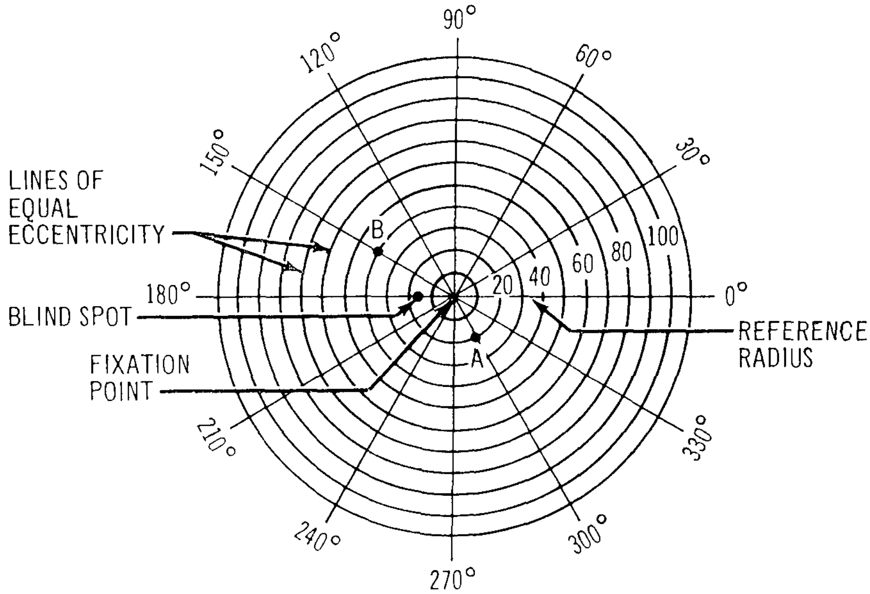


Figure 47. LOCATING POINTS ON A CHART OF THE VISUAL FIELD OF THE LEFT EYE

The direction from the center of a visual field is also often given as up, down, nasal, or temporal. Nasal refers to the half of the visual field toward the viewer's nose and temporal to the half toward his temple. The terms are limited to a monocular field. Obviously, the nasal half of the field is to the right in the left eye and to the left in the right eye, and the temporal half is to the left in the left eye and to the right in the right eye. Since the field in Fig. 47 is for the left eye (as shown by the location of the blind spot), point B could be located generally as "40 degrees on the temporal side" or precisely as "40 degrees out and 30 degrees above the horizontal in the upper temporal quadrant".

The terms nasal and temporal are also used to describe positions on the retina of the eye; the temporal retina is the side toward the temple, and the nasal retina is the side toward the nose. Note, however, that an object in the nasal field will be imaged on the temporal retina, and an object in the temporal field will be imaged on the nasal retina, because light rays cross the visual axis. In Fig. 42, for example, the object lies 30 degrees from the visual axis on the temporal retina. Similarly, an object that is up in the visual field will be down on the retina.

The angle subtended at the cornea of the eye by the viewed object is the visual angle. It is determined by the following equation in which "L" represents the size of the object measured perpendicular to the line of sight and "D" is the distance from the eye to the object:

$$\text{Visual Angle} = 2 \arctan \frac{L}{2D} \quad \text{(See Fig. 48)}$$

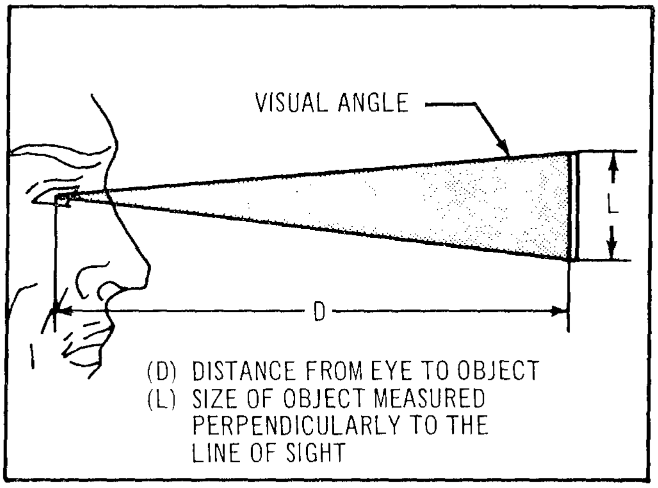


Figure 48. VISUAL ANGLE

The central portion of the visual area of the retina has a capability of fine definition. The function or capability is called central or foveal vision, and is essential for reading instruments and assessing displays such as the VSD and HSD. The centermost and best visual area, about 1° solid angle, is the fovea. Excellent detail vision extends over a larger area, perhaps 3 to 5 degrees, which is populated most heavily with cones.

Figure 49 shows the relationships between the probability of detection and the visual angle. Table 34 gives the horizontal and vertical angular limits of the human visual field as given in Wulfeck, et al. (Ref. 41) who also reported that the eyes can be turned approximately 50 degrees to either side of the resting position, 40 degrees above, 60 degrees below, and 10 degrees in torsion about the optical axis.

It should be noted, however, that with a full range of head, eye, and torso movement, the field of vision is 360 degrees in all planes (Ref. 41). However, the most important data for the computerized man-model in evaluating cockpit designs are the eyeball rotations, the narrow 3 to 5 degrees of detailed vision, and especially the 1 degree of foveal vision.

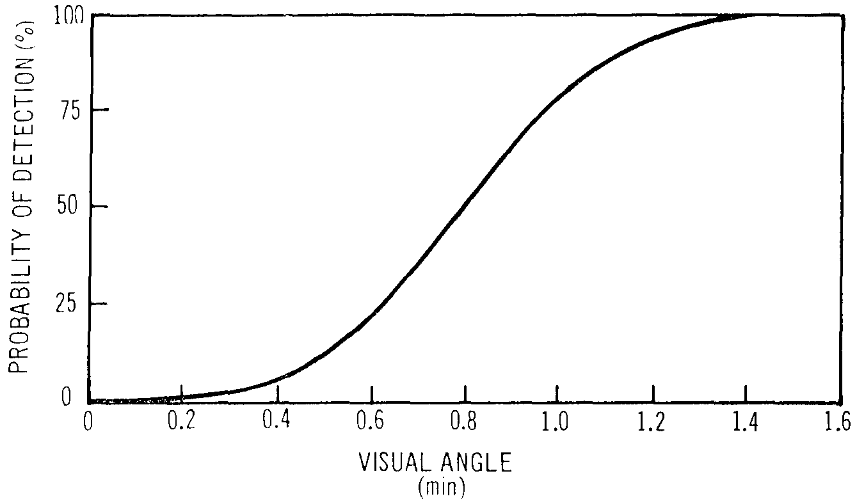


Figure 49. PROBABILITY OF DETECTION AS A FUNCTION OF VISUAL ANGLE

From White (Ref. 58)

Table 34 (Contd). Horizontal and Vertical Angular Limits of the Human Visual Field

MOVEMENT PERMITTED	TYPE OF FIELD AND FACTORS LIMITING FIELD	HORIZONTAL LIMITS: Temporal Ambinocular Field (each side)	HORIZONTAL LIMITS: Nasal Binocular Field (each side)	VERTICAL LIMITS: Field Angle Up	VERTICAL LIMITS: Field Angle Down
e. Maximum movements of head	Limits of head motion	72°	72°	80°*	90°*
	Maximum eye deviation	74°	55°	48°	66°
	Range of fixation (from central body line)	146°	127°	128°	156°
	Peripheral field (from point of fixation)	91°	Approx (5°)	18°	16°
	Total peripheral field (from central body line)	237°	132°	146°	172°**

* Estimated on the basis of tests on a single subject.

** Ignoring obstruction of body (and knees if seated). This obstruction would probably impose a maximum field of 90° (or less, seated) directly downward; however, this would not apply downward to either side.

*** This is the maximum possible peripheral field; rotating the eye in the nasal direction will not extend it, because it is limited by the nose and other facial structures rather than the optical limits of the eye. The figures in parentheses on the line above are calculated values, chosen to give the maximum limit thus indicated.

NOTES

1. All data except as noted are from Hall and Greenbaum (Ref. 59).
2. The ambinocular field is defined here as the total area that can be seen by either eye; it is not limited to the binocular field, which can be seen by both eyes at once. That is, at the sides, it includes monocular regions visible to the right eye but not to the left, and vice versa.
3. The term binocular is here restricted to the central region that can be seen by both eyes simultaneously (stereoscopic vision). It is bounded by the nasal field-limits of the eyes.

From Wulfeck, J. W., et al. (Ref. 41)

Table 34. Horizontal and Vertical Angular Limits of the Human Visual Field

MOVEMENT PERMITTED	TYPE OF FIELD AND FACTORS LIMITING FIELD	HORIZONTAL LIMITS: Temporal Ambinocular Field (each side)	HORIZONTAL LIMITS: Nasal Binocular Field (each side)	VERTICAL LIMITS: Field Angle Up	VERTICAL LIMITS: Field Angle Down
a. **Moderate movements of head and eyes, assumed as:**	Range of Fixation	60°		45°	
Eyes: 15° right or left; 15° up or down	Eye deviation (assumed)	15°	15°	15°	15°
	Peripheral field from point of fixation	95°	(45°)	46°	67°
Head: 45° right or left	Net peripheral field from central fixation	110°	60°***	61°	82°
30° up or down	Head rotation (assumed)	45°	45°	30°*	30°*
	Total peripheral field (from body line	155°	105°	91°	112°**
b. Head fixed; Eyes fixed (central position to head)	Field of peripheral vision (central fixation)	95°	60°	46°	67°
c. Head fixed	Limits of eye deviation (= range of fixation)	74°	55°	48°	66°
Eyes maximum deviation	Peripheral field (from point of fixation)	91°	Approx (5°)	18°	16°
	Total peripheral field (from central head line)	165°	60°***	66°	82°
d. Head maximum movement	Limits of head motion (= range of fixation)	72°	72°	80°*	90°*
Eyes fixed (central with respect to head)	Peripheral field (from point of fixation)	95°	60°	46°	67°
	Total peripheral field (from central body line)	167°	132°	126°	157°**

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APPENDIX A

MAN-MODEL SPECIFICATIONS

1.0 SCOPE

The following specifications and requirements outline the items to be provided and the constraints within which the Baseline Man-Model (BOEMAN I) is to be developed during Phase I of the Cockpit Geometry Evaluation Program (Contract No. N00014-68-C-0289). This is a program being conducted under the auspices of the Joint Army Navy Aircraft Instrumentation Research (JANAIR) Program Working Group (Committee).

The requirements detailed for the Baseline Man-Model are specific to Phase I and may or may not be applicable to later phases of the program. The requirements for the related section of the Computer Program will, in general, be applicable to the later phases of the Evaluation Program.

2.0 REFERENCE DOCUMENTS

The following documents include specifications and requirements for the Baseline Man-Model:

1. "Proposal for Cockpit Geometry Evaluation Method(s) Development", Boeing Document No. D6-15944, dated 17 April 1967.
2. Clarification of Boeing Document D6-15944, Attachment to Boeing letter 6-1100-22-2300, dated 13 September 1967.
3. Addendum to Boeing Document No. D6-15944, dated 30 October 1967.
4. Boeing Document No. D6-53521, "Cockpit Geometry Evaluation Program" (a brochure to provide additional clarification of the program).
5. "Human Data for A Computerized Dynamic Man-Model - BOEMAN", Boeing Document No. D6-53552, dated 1 March 1968.

3.0 EXPLANATION OF TERMS

Computer Program - The entire package of instructions to evaluate by digital computer the physical arrangement of a workspace, using a 21-pin-joint man-model.

Routines/Subprograms/Sections - Synonymous terms describing subsets of the computer program.

Man-Model - The abstraction of a given human pilot as a three-dimensional 21 pin-joint stick figure.

Math Model (Section) - That part of the computer program which calculates the joint locations and orientations during a movement.

Conventional (Standard) Anthropometric Dimensions - Measurements taken on live humans to define external dimensional characteristics.

Link - Ordinarily a connector between adjacent joint centers; otherwise, the segment beyond a terminal joint; a member of an immovable pair (neck and thoracic links); the distance between eyeball centers and the head link.

Task - A discrete physical movement or set of movements.

Movement - A specification of a fully defined initial position of all joints and a final position of all terminal joints (hands, feet, and head).

Geometry - The physical dimensions, volumes, shapes, locations, and orientations of all components and crewmembers in a workspace.

Computer Graphics Program - A separate computer program to draw pictures by computer controlled drafting machines or display pictures on a cathode ray tube (CRT).

Pre-Analysis (Section) - That part of the computer program which is to decide, a priori, if a given task is physically feasible.

Interference (Section) - That part of the computer program which is to discover if or how much interference (physical and visual) has occurred and how to eliminate it.

Input (Section) - That part of the computer program which describes the anthropometric characteristics and capabilities of any sized human, the sequence of tasks and the workspace geometry or physical restrictions.

Output (Section) - That part of the computer program which yields the numerical performance indicators and the task oriented history of the simulation using the man-model.

4.0 REQUIREMENTS

4.1 GENERAL

The Cockpit Geometry Evaluation Method(s) Program was instituted to establish an evaluation technique which is less costly in manhours, time, materials, and money than those presently used. The present techniques have been streamlined through the years and are not suited for additional reductions in flow-time or money costs. The three present methods employed (analysis, mockup, and flight test) are capable of accommodating only a limited number of geometric configurations with a limited number of operator sizes within time and economic constraints allowed.

The development of an improved evaluation method necessitates use of an efficient, rapid and accurate process or technique. The speed and accuracy available from a computer can provide the means to reduce evaluation time. In addition, the computer program is written to cover the large range of anthropometric sizes currently represented by the military pilot population. The tool, thus developed, will be especially useful and important during conceptual design studies. Large variations in operator size as well as many variations in the geometry of the crewstation can be examined before hardware must be designed and constructed.

The development of a computer program to provide the automated evaluation is a major undertaking. Models to synthesize three-dimensional human movements are not presently available. It is necessary, therefore, to develop this computerized articulated man-model in order that rapid evaluations can be successfully completed.

The general descriptions contained herein are to serve as guidelines in the development of the man-model and related sections of the computer program. The desired goals, functions and requirements, outlined in the following pages, are to be used in conjunction with the proposal on Cockpit Geometry Evaluation Method(s) (Boeing Document D6-15944).

4.2 SPECIFICATIONS AND CONSTRAINTS

The computer program to be developed will use input data consisting of: specified geometry, operator size, task sequences and physical restrictions to movement. These data are to be used to determine the adequacy of a given geometry. Assessments of reach capability and visual interferences, as well as summations of joint, mass and eye travels will be made. Body joint locations will be predicted. Discrepancies between control locations and human reach capability will be identified and noted. The results will be provided in tables, graphs and pictures as desired.

The initial man-model is to consist of a 21 pin-joint, stick-man, and the geometry will be lines and/or plane surfaces. Refinements will be made in a succession of steps to improve the configuration definition of both the human form and the geometry. An illustration of a proposed six-year (six-phase) program is shown in Figure 1.

The computer program for Phase I is to consist of six separate sections: (1) input data; (2) mathematical model to predict body joint locations; (3) visual assessment; (4) pre-analysis; (5) summation; and (6) output displays.

The input data will include those items necessary to specific crewstation geometry (the cockpit in this case), the operator (pilot) anthropometric

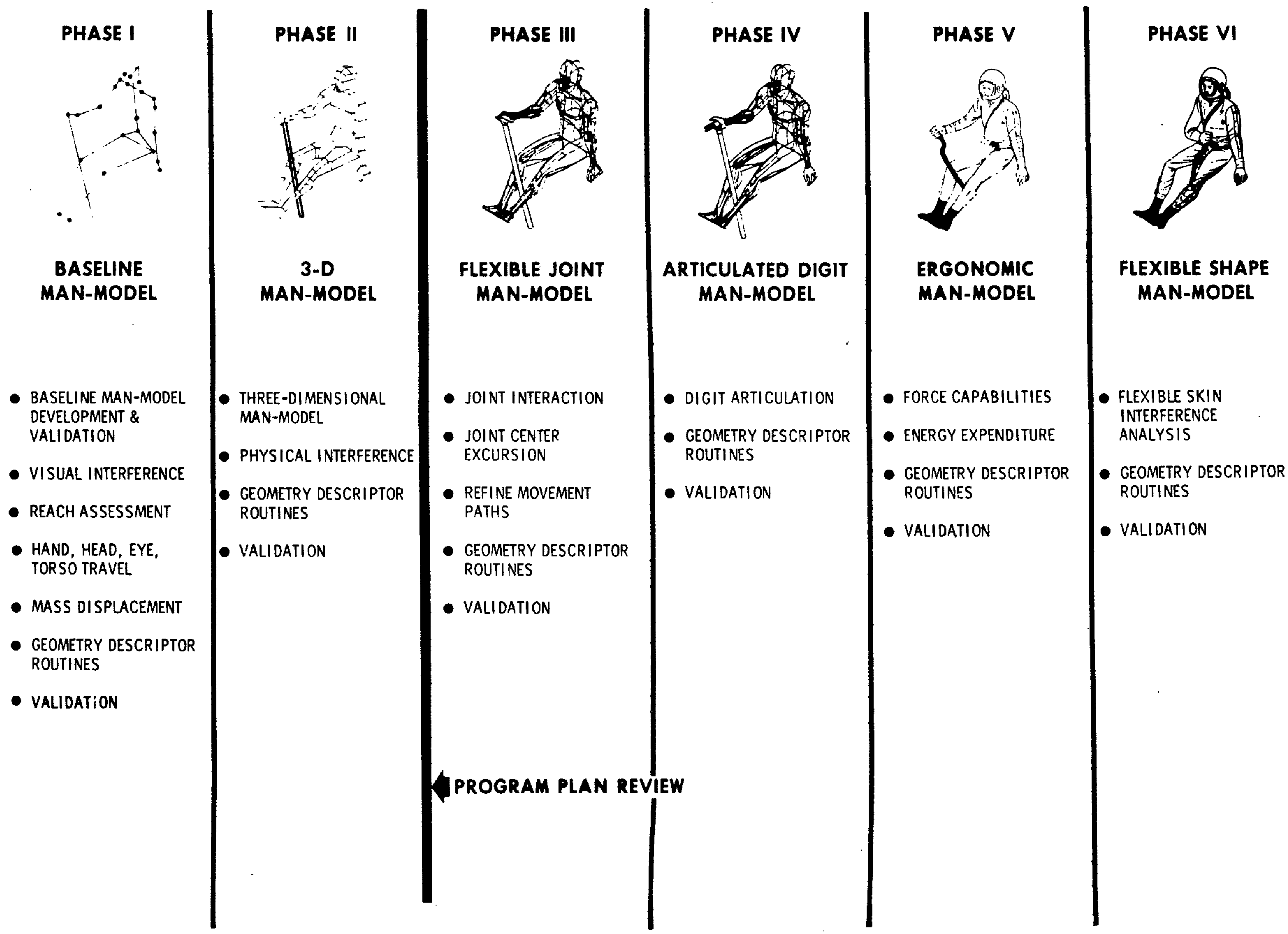

Figure 50. RESEARCH PLAN SUMMARY

characteristics, the tasks to be performed, and the restrictions of movement of the operator. In addition, instructions will detail the amount, type, and quantity of evaluations to be performed and the manner in which results are to be displayed.

The mathematical model (man-model) is that mathematical description of the human form and its movement characteristics. The man-model is to identify the spetial locations of the body joints for specified movements or tasks required in the specified geometry.

Visual assessment capabilities are included in the first phase to (1) identify items which are not in view from the position synthesized for the operator, and (2) require simulation of that position the operator must assume in order to view the desired object.

The pre-analysis section of the computer program does an initial check on the feasibility of reaching and operating the specified control. In the event the specified operator is capable of the physical operation desired, a complete body joint location is specified, summations made, etc. If this operator cannot perform the required movements, the discrepancy is noted and amount of deviation from possible movement or reach capability is determined and recorded.

The results of the evaluation, body joint locations, joint, link, and mass movements are recorded. The output will be tables, graphs, and pictures drawn by computer graphics programs. The man-model defines joint spatial locations for each specified task. The joint location and link orientation will be used in computer graphic routines to depict the operator in the crewstation under investigation. The graphs will provide instantaneous

and/or cumulative travel for each link. This includes such items as eye or head deflection, wrist or palm movement, mass center displacement, and mass times distance totals.

4.3 INPUT DATA

The input data will include (1) cockpit configuration, (2) link dimensions, (3) task sequence, (4) standard position of the operator, and (5) joint angular limitations for unencumbered operators.

The following outline lists those presently identified items which must be considered. Additional items will be included when identified.

4.3.1 Cockpit Geometry

4.3.1.1 Raw Data

a. Cockpit (eye) reference point for defining initial position of the man-model.

b. Cockpit geometry x, y, z coordinates (controls, panels, displays, windscreen, seats, restraints, etc.).

c. Cockpit control movements (path, movement, etc.).

d. Surface description (fixed location) of additional crew member(s).

4.3.1.2 Transformation Adjustments and Subprograms

a. Transform all control and cockpit geometry locations from eye reference point to seat reference point (calculation based on link dimensions and standard position of 23-joint man-model).

b. Allow for program calculation and storage of new positions that movable controls can assume.

c. Data storage and retrieval subprogram to allow efficient program storage (i.e., cockpit control codes to reference the locations and dimensions of the controls).

4.3.2 Link Characteristics

4.3.2.1 Data Stored

a. Operator link dimensions by mean and standard deviation.

b. Mass quantity and location for the links and body segments by mean and standard deviation.

c. Means of cross-referencing between the Hertzberg, et al., (AMRL-TR-52-321) Air Force pilot sample and other anthropometric surveys.

d. Subprogram to calculate link dimension by specifying the percentile value of a given link, and then selecting the corresponding mass quantity and location.

4.3.3 Task Sequence

4.3.3.1 Data

a. Definition of the task (terminal point locations, orientation of links, time for performance, joint velocities and angular acceleration allowed, time to maintain position, sentence descriptors, etc.).

b. Task sequence and/or frequency.

4.3.3.2 Transformation, Adjustments, and Subprograms

a. Transform the location of terminal points into cockpit codes.

b. Check for task feasibility with respect to the cockpit envelope, time compatibility, additional crewmember envelope, pilot's link dimensions or angular limitation of joints.

4.3.4 Initial Position

4.3.4.1 Data

a. Eye reference point

b. Starting position of hands

c. Location of all other joints for specified operator

4.3.4.2 Transformations, Adjustments, and Subprograms

a. Subprogram to identify the joint and link locations of the specified operator.

b. Specification of standard position via coordinate system which is compatible with the computer graphics program.

4.3.5 Joint Angular Limits

4.3.5.1 Standard Position

a. Head, Thoracic, Lumbar, Pelvic, Humeral, Tibial, and Foot Links Vertical

b. Radial, Hand, Femoral Links Horizontal in **Sagittal Planes**

4.3.5.2 Data

a. Absolute physical angular limitations of joints expressed as $\pm$ deviations from the standard angle (0°, 0°, 0°) of each joint.

b. Modified limitations based on encumbrances (seat, harness, lap belt, clothing, etc.).

c. A definition of preferred or "comfortable" joint angular positions.

4.3.5.3 Transformations, Adjustments, and Subprograms

a. Define priorities to be used for deviating from the preferred "cone-of-operation".

b. Define rules for determining the amount of individual joint movement outside the "preferred cones" before requiring angular changes in the adjacent joints.

4.4 OUTPUT DATA

4.4.1 Printed Output

4.4.1.1 Cockpit Geometry (from input).

4.4.1.2 Link Dimensions (from input).

4.4.1.3 Starting (Standard) Position.

4.4.1.4 Joint Angular Limits (from input).

4.4.1.5 Time Specified for Beginning and Execution of a Task, or Maintaining a Location (from input).

4.4.1.6 Reasons for Non-feasibility of a Specified Task and the Amount of Deviation (determined in pre-analysis section).

4.4.1.7 Path of Motion of Terminal Point(s) (Straight Line Equation or Other Curve from Model).

4.4.1.8 Joint Locations for a Specified Number of Positions Along the Movement Path (depending upon the path length) Including Initial and Final Positions.

4.4.1.9 Results of Visual Interference Assessment

a. Portion of the viewed object which is obstructed in the initial position of the head.

b. Position to which the head is moved to eliminate interference.

c. Distance the head is moved to alleviate interference.

d. Percent of the central cone obscured in the initial and redefined head positions.

4.4.1.10 Summation Quantities

a. Joint center of travel

b. Mass displacement (each link and total body).

c. Head angular deflection to observe all terminal hand positions plus other specified sighting points.

d. Eye deflection (in addition to head movement).

The above quantities must be identified for each task specified, as well as the cumulative amounts for an entire mission. These data will be used to display instantaneous and cumulative results via graphs and/or tables.

APPENDIX B

Bivariant data on pertinent anthropometric measurements of the 1950 USAF pilot survey by Hertzberg, et al. (Ref. 1); the yet unpublished 1967 USAF pilot survey; the 1960-61 combined NATO survey of military personnel of Greece, Turkey, and Italy; and the 1964 Naval aviators survey (Ref. 47) are provided herein.

BIVARIANT DATA OF THE 1950 USAF PILOT SURVEY

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND SEATED HEIGHT

SEATED HEIGHT

FORWARD ARM REACH	772.50	787.50	802.50	817.50	832.50	847.50	862.50	877.50	892.50	907.50	922.50	937.50	952.50	967.50	982.50	997.50	1012.50	1027.50	TOTAL
952.50										1			2	1		1			5
937.50									1	1	2	1	4	2		1		1	13
922.50								2	2	4	7	9	7	4	4	1			40
907.50						1		3		4	10	12	9	4	3	2	3		51
892.50							1	5	9	12	21	22	18	12	4	2			106
877.50					1	2	2	7	18	35	43	35	30	21	14	4	1		213
862.50						1	5	20	46	55	62	60	37	20	8	5	1		320
847.50					1	8	15	31	60	65	102	77	62	35	10	4		1	471
832.50				2	3	11	22	54	79	91	114	89	54	30	10			1	560
817.50					5	12	28	39	83	113	120	95	54	14	7	2			572
802.50					3	13	38	70	103	109	98	76	32	16	4	2			564
787.50			1	5	3	14	33	67	77	99	66	51	19	7	1	1			444
772.50			1	2	7	20	27	50	49	51	46	20	10	5		1			289
757.50				1	6	10	21	38	43	38	23	8	4	4	1				197
742.50					2	4	10	24	20	15	12	5	2	1					95
727.50	1		1	1	1	4	10	7	7	7	3	2							44
712.50						1	1	4	1	1									8
697.50							1	1	1	1	1								5
682.50					2	1													3
	1	0	3	11	34	102	214	422	599	702	730	562	344	176	66	26	5	3	4000

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	820.48	40.29	(0.484)*Y + (378.761)	37.14
Y-SITTING HEIGHT	913.04	32.26	(0.310)*X + (658.586)	29.74

***

CORRELATION COEFFICIENT 0.387 (BASED ON ORIGINAL DATA) 0.382 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.384	0.651	15+3983	-0.97
Y AS A FUNCTION OF X	0.387	1.141	17+3981	0.51

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND SEATED HEIGHT

SEATED HEIGHT

	772.50	787.50	802.50	817.50	832.50	847.50	862.50	877.50	892.50	907.50	922.50	937.50	952.50	967.50	982.50	997.50	1012.50	1027.50	TOTAL
F 952.50										0.0			0.0	0.0		0.0			0.1
O 937.50									0.0	0.0	0.0	0.0	0.1	0.0		0.0		0.0	0.3
R 922.50								0.0	0.0	0.1	0.2	0.2	0.2	0.1	0.1	0.0			1.0
W 907.50						0.0		0.1		0.1	0.2	0.3	0.2	0.1	0.1	0.0	0.1		1.3
A 892.50							0.0	0.1	0.2	0.3	0.5	0.5	0.4	0.3	0.1	0.0			2.6
R 877.50					0.0	0.0	0.0	0.2	0.4	0.9	1.1	0.9	0.7	0.5	0.3	0.1	0.0		5.3
D 862.50						0.0	0.1	0.5	1.1	1.4	1.5	1.5	0.9	0.5	0.2	0.1	0.0		8.0
847.50					0.0	0.2	0.4	0.8	1.5	1.6	2.5	1.9	1.5	0.9	0.2	0.1		0.0	11.8
A 832.50				0.0	0.1	0.3	0.5	1.3	2.0	2.3	2.8	2.2	1.3	0.7	0.2			0.0	14.0
R 817.50					0.1	0.3	0.7	1.0	2.1	2.8	3.0	2.4	1.3	0.3	0.2	0.0			14.3
M 802.50					0.1	0.3	0.9	1.7	2.6	2.7	2.4	1.9	0.8	0.4	0.1	0.0			14.1
787.50			0.0	0.1	0.1	0.3	0.8	1.7	1.9	2.5	1.6	1.3	0.5	0.2	0.0	0.0			11.1
R 772.50			0.0	0.0	0.2	0.5	0.7	1.2	1.2	1.3	1.1	0.5	0.2	0.1		0.0			7.2
E 757.50				0.0	0.1	0.2	0.5	0.9	1.1	0.9	0.6	0.2	0.1	0.1	0.0				4.9
A 742.50					0.0	0.1	0.2	0.6	0.5	0.4	0.3	0.1	0.0	0.0					2.4
C 727.50	0.0		0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.1	0.0							1.1
H 712.50						0.0	0.0	0.1	0.0	0.0									0.2
697.50							0.0	0.0	0.0	0.0	0.0								0.1
682.50					0.0	0.0													0.1
	0.0	0.	0.1	0.3	0.8	2.5	5.3	10.5	15.0	17.5	18.2	14.0	8.6	4.4	1.6	0.6	0.1	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 4000.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	820.48	40.29	(0.484)*Y + (378.761)	37.14
Y-SITTING HEIGHT	913.04	32.26	(0.310)*X + (658.586)	29.74

***

CORRELATION COEFFICIENT 0.387 (BASED ON ORIGINAL DATA) 0.382 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	T.R.
X AS A FUNCTION OF Y	0.394	0.651	15+3983	-0.97
Y AS A FUNCTION OF X	0.387	1.141	17+3981	0.51

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND STATURE

STATURE

FORWARD ARM REACH	1509.00	1529.00	1549.00	1569.00	1589.00	1609.00	1629.00	1649.00	1669.00	1689.00	1709.00	1729.00	1749.00	1769.00	1789.00	1809.00	1829.00	1849.00	1869.00	1889.00	1909.00	1929.00	1949.00	1969.00	TOTAL
952.50																	2		1			1		1	5
937.50													1	1	1		3	1	2	1	2			1	13
922.50										1		1		3	1	3	7	5	6	4	2	6	1		40
907.50													1	5	8	7	9	9	3	5	1	3			51
892.50							1				1	2	3	11	16	16	18	13	11	7	3	3	1		106
877.50											9	8	15	26	32	31	25	29	23	10	4	1			213
862.50										4	12	20	45	57	59	33	38	26	17	5	4	1			320
847.50								3	4	9	24	44	71	69	74	67	57	17	20	4	6	1	1		471
832.50								4	13	26	39	67	81	101	89	77	32	19	9	3					560
817.50				1		1	4	8	21	34	63	80	102	85	71	49	28	17	3	4	1				572
802.50						2	7	14	28	55	69	99	91	81	58	40	17	2	1						564
787.50					2	6	11	19	47	55	60	86	63	47	26	18	2	1	1						444
772.50				1	5	4	18	20	35	49	48	41	27	23	12	3	3								289
757.50				1	2	6	17	23	33	32	24	25	18	10	3	2	1								197
742.50				1	1	4	10	17	15	19	13	8	3	1	2	1									95
727.50		1		2	3	3	3	8	8	9	7		1												44
712.50				1		2	2		1	2															8
697.50						1		2	1	1															5
682.50	1	1	1																						3
	1	2	1	7	13	29	73	118	206	295	369	481	522	520	451	347	242	139	97	43	23	16	3	2	4000

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	820.48	40.29	(0.424)*Y + (76.877)	30.69
Y-HEIGHT (STATURE)	1755.60	61.62	(0.991)*X + (942.792)	46.94

***

CORRELATION COEFFICIENT 0.648 (BASED ON ORIGINAL DATA) 0.639 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.642	1.270	22+3976	0.92
Y AS A FUNCTION OF X	0.642	1.553	17+3981	1.49

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND STATURE

STATURE

	1509.00	1529.00	1549.00	1569.00	1589.00	1609.00	1629.00	1649.00	1669.00	1689.00	1709.00	1729.00	1749.00	1769.00	1789.00	1809.00	1829.00	1849.00	1869.00	1889.00	1909.00	1929.00	1949.00	1969.00	TOTAL
F 952.50																	0.0		0.0			0.0		0.0	0.1
O 937.50													0.0	0.0	0.0		0.1	0.0	0.0	0.0	0.0			0.0	0.3
R 922.50										0.0		0.0		0.1	0.0	0.1	0.2	0.1	0.1	0.1	0.0	0.1	0.0		1.0
W 907.50													0.0	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.0	0.1			1.3
A 892.50							0.0				0.0	0.0	0.1	0.3	0.4	0.4	0.4	0.3	0.3	0.2	0.1	0.1	0.0		2.6
R 877.50											0.2	0.2	0.4	0.6	0.8	0.8	0.6	0.7	0.6	0.2	0.1	0.0			5.3
D 862.50										0.1	0.3	0.5	1.1	1.4	1.4	0.8	0.9	0.6	0.4	0.1	0.1	0.0			8.0
847.50								0.1	0.1	0.2	0.6	1.1	1.8	1.7	1.8	1.7	1.4	0.4	0.5	0.1	0.1	0.0	0.0		11.8
A 832.50								0.1	0.3	0.6	1.0	1.7	2.0	2.5	2.2	1.9	0.8	0.5	0.2	0.1					14.0
R 817.50				0.0		0.0	0.1	0.2	0.5	0.8	1.6	2.0	2.5	2.1	1.8	1.2	0.7	0.4	0.1	0.1	0.0				14.3
M 802.50						0.0	0.2	0.3	0.7	1.4	1.7	2.5	2.3	2.0	1.4	1.0	0.4	0.0	0.0						14.1
787.50					0.0	0.1	0.3	0.5	1.2	1.4	1.5	2.1	1.6	1.2	0.6	0.4	0.0	0.0	0.0						11.1
R 772.50				0.0	0.1	0.1	0.4	0.5	0.9	1.2	1.2	1.0	0.7	0.6	0.3	0.1	0.1								7.2
E 757.50				0.0	0.0	0.1	0.4	0.6	0.8	0.8	0.6	0.6	0.4	0.2	0.1	0.0	0.0								4.9
A 742.50				0.0	0.0	0.1	0.2	0.4	0.4	0.5	0.3	0.2	0.1	0.0	0.0	0.0									2.4
C 727.50		0.0		0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2		0.0												1.1
H 712.50				0.0		0.0	0.0		0.0	0.0															0.2
697.50						0.0		0.0	0.0	0.0															0.1
682.50	0.0	0.0	0.0																						0.1
	0.0	0.0	0.0	0.2	0.3	0.7	1.8	2.9	5.1	7.4	9.2	12.0	13.0	13.0	11.3	8.7	6.0	3.5	2.4	1.1	0.6	0.4	0.1	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 4000.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	820.48	40.29	(0.424)*Y + (76.877)	30.69
Y-HEIGHT (STATURE)	1755.60	61.62	(0.991)*X + (942.790)	46.94

***

CORRELATION COEFFICIENT 0.648 (BASED ON ORIGINAL DATA) 0.639 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.642	1.270	22+3976	0.92
Y AS A FUNCTION OF X	0.642	1.553	17+3981	1.49

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND SEATED SHOULDER HEIGHT

SEATED SHOULDER HEIGHT

		484.00	494.00	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	534.00	594.00	604.00	614.00	624.00	634.00	644.00	654.00	664.00	674.00	684.00	TOTAL
F	952.50										1				1		1	1		1			5
O	937.50										2	3		2	2	1		2				1	13
R	922.50							1			4	5	5	8	4	4	4	1	2	2			40
W	907.50							2	2		3	3	7	6	13	6	5	2	1	1			51
A	892.50							2	1	5	8	11	14	17	18	14	9	5	2				106
R	877.50				1		1	3	4	13	23	27	31	25	27	19	16	11	7	3	2		213
D	862.50						2	3	12	15	41	49	44	58	33	32	16	9	5	1			320
	847.50				1	3	6	6	19	32	50	60	79	69	50	29	38	21	5	2	1		471
A	832.50			1	3	2	10	19	42	36	74	62	82	96	47	41	25	6	10	4			560
R	817.50			1	1	4	13	20	33	47	52	81	84	93	70	36	21	10	3	1	2		572
M	802.50				4	5	14	32	46	52	73	86	76	62	44	34	16	19		1			564
	787.50			2	2	12	14	20	39	57	57	66	57	45	33	20	12	5	1	2			444
R	772.50			3	5	11	16	13	29	34	41	35	35	29	19	10	5	2	2				289
E	757.50				4	4	8	16	19	27	35	24	20	23	5	5	4	1	2				197
A	742.50				1	1	5	9	13	8	20	13	11	6	6	1		1					95
C	727.50	1			1	3	4	5	4	3	8	9	2	4									44
H	712.50							1	1	2	2	1		1									8
	697.50						1					1	1	2									5
	682.50				1	1	1																3
		1	0	7	24	46	95	152	264	331	494	536	548	546	372	252	172	96	40	18	5	1	4000

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	820.49	40.29	(0.451)*Y + (554.220)	38.19
Y-SHOULDER H'T/SIT.	590.86	28.46	(0.225)*X + (406.377)	26.98

***

CORRELATION COEFFICIENT 0.318 (BASED ON ORIGINAL DATA) 0.315 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.319	0.606	18+3980	-1.27
Y AS A FUNCTION OF X	0.322	1.257	17+3981	0.80

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND SEATED SHOULDER HEIGHT

SEATED SHOULDER HEIGHT

		484.00	494.00	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	644.00	654.00	664.00	674.00	684.00	TOTAL
F	952.50										0.0				0.0		0.0	0.0		0.0			0.1
O	937.50										0.0	0.1		0.0	0.0	0.0		0.0				0.0	0.3
R	922.50							0.0			0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.0			1.0
W	907.50							0.0	0.0		0.1	0.1	0.2	0.1	0.3	0.1	0.1	0.0	0.0	0.0			1.3
A	892.50							0.0	0.0	0.1	0.2	0.3	0.3	0.4	0.4	0.3	0.2	0.1	0.0				2.6
R	877.50				0.0		0.0	0.1	0.1	0.3	0.6	0.7	0.8	0.6	0.7	0.5	0.4	0.3	0.2	0.1	0.0		5.3
D	862.50						0.0	0.1	0.3	0.4	1.0	1.2	1.1	1.4	0.8	0.8	0.4	0.2	0.1	0.0			8.0
	847.50				0.0	0.1	0.1	0.1	0.5	0.8	1.2	1.5	2.0	1.7	1.2	0.7	0.9	0.5	0.1	0.0	0.0		11.8
A	832.50			0.0	0.1	0.0	0.2	0.5	1.0	0.9	1.8	1.5	2.0	2.4	1.2	1.0	0.6	0.1	0.2	0.1			14.0
R	817.50			0.0	0.0	0.1	0.3	0.5	0.9	1.2	1.3	2.0	2.1	2.3	1.7	0.9	0.5	0.2	0.1	0.0	0.0		14.3
M	802.50				0.1	0.1	0.3	0.8	1.1	1.3	1.8	2.1	1.9	1.5	1.1	0.8	0.4	0.5		0.0			14.1
	787.50			0.0	0.0	0.3	0.3	0.5	1.0	1.4	1.4	1.6	1.4	1.1	0.9	0.5	0.3	0.1	0.0	0.0			11.1
R	772.50			0.1	0.1	0.3	0.4	0.3	0.7	0.8	1.0	0.9	0.9	0.7	0.5	0.2	0.1	0.0	0.0				7.2
E	757.50				0.1	0.1	0.2	0.4	0.5	0.7	0.9	0.6	0.5	0.6	0.1	0.1	0.1	0.0	0.0				4.9
A	742.50				0.0	0.0	0.1	0.2	0.3	0.2	0.5	0.3	0.3	0.1	0.1	0.0		0.0					2.4
C	727.50	0.0			0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.0	0.1									1.1
H	712.50							0.0	0.0	0.0	0.0	0.0		0.0									0.2
	697.50						0.0					0.0	0.0	0.0									0.1
	682.50				0.0	0.0	0.0																0.1
		0.0	0.	0.2	0.6	1.1	2.4	3.8	6.6	8.3	12.3	13.4	13.7	13.6	9.3	6.3	4.3	2.4	1.0	0.4	0.1	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 4000.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	820.48	40.29	(0.451)*Y + (554.220)	38.19
Y-SHOULDER H'T/SIT.	590.86	28.46	(0.225)*X + (406.377)	26.98

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CORRELATION COEFFICIENT 0.318 (BASED ON ORIGINAL DATA) 0.315 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.319	0.606	18+3980	-1.27
Y AS A FUNCTION OF X	0.322	1.257	17+3981	0.80

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND BUTTOCK-KNEE LENGTH

BUTTOCK-KNEE LENGTH

	504 .00	514 .00	524 .00	534 .00	544 .00	554 .00	564 .00	574 .00	584 .00	594 .00	604 .00	614 .00	624 .00	634 .00	644 .00	654 .00	664 .00	674 .00	684 .00	694 .00	704 .00	TOTAL
F 952.50													1	1	1		1			1		5
O 937.50										1			4		4	2	1	1				13
R 922.50								1				2	7	7	10	5	4	2	1	1		40
W 907.50								1	1	2	6	6	14	8	4	4	3	2				51
A 892.50							1	1		8	11	19	21	10	12	11	5	5	1		1	106
R 877.50								8	10	23	32	32	39	24	25	14	4	1	1			213
D 862.50							5	8	24	43	60	55	43	40	23	9	5	4	1			320
847.50					1		13	25	46	69	73	87	61	48	31	8	6	3				471
A 832.50				2		6	14	36	79	84	102	110	68	37	15	6	1					560
R 817.50				1	1	7	34	60	91	102	106	86	40	23	15	5		1				572
M 802.50				1	4	21	51	57	96	102	98	76	38	15	4	1						564
787.50			1	3	16	29	53	69	91	82	51	29	14	3	3							444
R 772.50			2	9	17	32	46	51	46	43	26	12	3	2								289
E 757.50				9	12	17	42	45	24	27	15	3	2	1								197
A 742.50	1		1	7	11	18	12	16	15	9	3	1	1									95
C 727.50	1		2	3	6	9	9	9	3	2												44
H 712.50	1		1	1		2		1	1	1												8
697.50			1		1	2		1														5
682.50		1	2																			3
	3	1	10	36	69	143	280	389	527	598	583	518	356	219	147	65	30	19	4	2	1	4000

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	820.49	40.29	(0.930)*Y + (262.428)	31.74
Y-BUTTOCK-KNEE L'GTH	599.93	26.68	(0.408)*X + (265.291)	21.02

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CORRELATION COEFFICIENT 0.616 (BASED ON ORIGINAL DATA) 0.608 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.611	1.141	19+3979	0.52
Y AS A FUNCTION OF X	0.612	1.659	17+3981	1.72

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND BUTTOCK-KNEE LENGTH

BUTTOCK-KNEE LENGTH

	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	644.00	654.00	664.00	674.00	684.00	694.00	704.00	TOTAL
F 952.50													0.0	0.0	0.0		0.0			0.0		0.1
O 937.50										0.0			0.1		0.1	0.0	0.0	0.0				0.3
R 922.50								0.0				0.0	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.0		1.0
W 907.50								0.0	0.0	0.0	0.1	0.1	0.3	0.2	0.1	0.1	0.1	0.0				1.3
A 892.50							0.0	0.0		0.2	0.3	0.5	0.5	0.2	0.3	0.3	0.1	0.1	0.0		0.0	2.6
R 877.50								0.2	0.2	0.6	0.8	0.8	1.0	0.6	0.6	0.3	0.1	0.0	0.0			5.3
D 862.50							0.1	0.2	0.6	1.1	1.5	1.4	1.1	1.0	0.6	0.2	0.1	0.1	0.0			8.0
847.50					0.0		0.3	0.6	1.1	1.7	1.8	2.2	1.5	1.2	0.8	0.2	0.1	0.1				11.8
A 832.50				0.0		0.1	0.3	0.9	2.0	2.1	2.5	2.7	1.7	0.9	0.4	0.1	0.0					14.0
R 817.50				0.0	0.0	0.2	0.8	1.5	2.3	2.5	2.6	2.1	1.0	0.6	0.4	0.1		0.0				14.3
M 802.50				0.0	0.1	0.5	1.3	1.4	2.4	2.5	2.4	1.9	0.9	0.4	0.1	0.0						14.1
787.50			0.0	0.1	0.4	0.7	1.3	1.7	2.3	2.0	1.3	0.7	0.3	0.1	0.1							11.1
R 772.50			0.0	0.2	0.4	0.8	1.1	1.3	1.1	1.1	0.6	0.3	0.1	0.0								7.2
E 757.50				0.2	0.3	0.4	1.0	1.1	0.6	0.7	0.4	0.1	0.0	0.0								4.9
A 742.50	0.0		0.0	0.2	0.3	0.4	0.3	0.4	0.4	0.2	0.1	0.0	0.0									2.4
C 727.50	0.0		0.0	0.1	0.1	0.2	0.2	0.2	0.1	0.0												1.1
H 712.50	0.0		0.0	0.0		0.0		0.0	0.0	0.0												0.2
697.50			0.0		0.0	0.0		0.0														0.1
682.50		0.0	0.0																			0.1
	0.1	0.0	0.2	0.9	1.7	3.6	7.0	9.7	13.2	14.9	14.6	12.9	8.9	5.5	3.7	1.6	0.7	0.5	0.1	0.0	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 4000.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	820.48	40.29	(0.930)*Y + (262.428)	31.74
Y-BUTTOCK-KNEE L'GTH	599.93	26.68	(0.408)*X + (265.291)	21.02

***

CORRELATION COEFFICIENT 0.616 (BASED ON ORIGINAL DATA) 0.608 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.611	1.141	19+3979	0.52
Y AS A FUNCTION OF X	0.612	1.659	17+3981	1.72

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND SEATED EYE HEIGHT

SEATED EYE HEIGHT

	667 .50	682 .50	697 .50	712 .50	727 .50	742 .50	757 .50	772 .50	787 .50	802 .50	817 .50	832 .50	847 .50	862 .50	877 .50	892 .50	907 .50	922 .50	937 .50	TOTAL
F 952.50									1		1		1	1	1					5
O 937.50									2	3	1	1	4		1				1	13
R 922.50						1		2	5	4	9	9	2	6	2					40
W 907.50						1		2	6	7	11	10	7	3		2	2			51
A 892.50						2	6	4	13	14	20	22	16	7	1	1				106
R 877.50					1	2	10	9	27	42	48	26	20	19	8	1				213
D 862.50					1	2	15	25	59	74	48	52	26	11	5	2				320
847.50				1	6	8	24	38	73	88	97	74	35	20	6		1			471
A 832.50			2	1	4	15	34	79	95	101	102	60	47	17	2		1			560
R 817.50			1	1	9	17	41	67	90	127	102	72	28	11	6					572
M 802.50					9	25	49	99	110	112	81	46	21	8	4					564
787.50			2	5	11	25	40	77	89	78	68	29	13	6	1					444
R 772.50		2		3	15	22	40	53	56	44	28	17	6	2		1				289
E 757.50				3	7	11	36	47	39	28	14	6	3	2	1					197
A 742.50				2	3	4	13	18	28	14	10	1	1	1						95
C 727.50	1			2	3	4	9	9	4	7	5									44
H 712.50						1	5		1		1									8
697.50						1			1	3										5
682.50					3															3
	1	2	5	18	72	141	322	529	699	746	646	425	230	114	38	7	4	0	1	4000

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	820.48	40.29	(0.457)*Y + (454.733)	37.56
Y-EYE HT/SITTING	799.59	31.87	(0.286)*X + (564.785)	29.71

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CORRELATION COEFFICIENT 0.362 (BASED ON ORIGINAL DATA) 0.355 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.360	0.866	16+3982	-0.28
Y AS A FUNCTION OF X	0.362	1.235	17+3981	0.75

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND SEATED EYE HEIGHT

SEATED EYE HEIGHT

	667 .50	682 .50	697 .50	712 .50	727 .50	742 .50	757 .50	772 .50	787 .50	802 .50	817 .50	832 .50	847 .50	862 .50	877 .50	892 .50	907 .50	922 .50	937 .50	TOTAL
F 952.50									0.0		0.0		0.0	0.0	0.0					0.1
O 937.50									0.0	0.1	0.0	0.0	0.1		0.0				0.0	0.3
R 922.50						0.0		0.0	0.1	0.1	0.2	0.2	0.0	0.1	0.0					1.0
W 907.50						0.0		0.0	0.1	0.2	0.3	0.2	0.2	0.1		0.0	0.0			1.3
A 892.50						0.0	0.1	0.1	0.3	0.3	0.5	0.5	0.4	0.2	0.0	0.0				2.6
R 877.50					0.0	0.0	0.2	0.2	0.7	1.0	1.2	0.6	0.5	0.5	0.2	0.0				5.3
D 862.50					0.0	0.0	0.4	0.6	1.5	1.8	1.2	1.3	0.6	0.3	0.1	0.0				8.0
847.50				0.0	0.1	0.2	0.6	0.9	1.8	2.2	2.4	1.8	0.9	0.5	0.1		0.0			11.8
A 832.50			0.0	0.0	0.1	0.4	0.8	2.0	2.4	2.5	2.5	1.5	1.2	0.4	0.0		0.0			14.0
R 817.50			0.0	0.0	0.2	0.4	1.0	1.7	2.2	3.2	2.5	1.8	0.7	0.3	0.1					14.3
M 802.50					0.2	0.6	1.2	2.5	2.7	2.8	2.0	1.1	0.5	0.2	0.1					14.1
787.50			0.0	0.1	0.3	0.6	1.0	1.9	2.2	1.9	1.7	0.7	0.3	0.1	0.0					11.1
R 772.50		0.0		0.1	0.4	0.5	1.0	1.3	1.4	1.1	0.7	0.4	0.1	0.0		0.0				7.2
E 757.50				0.1	0.2	0.3	0.9	1.2	1.0	0.7	0.3	0.1	0.1	0.0	0.0					4.9
A 742.50				0.0	0.1	0.1	0.3	0.4	0.7	0.3	0.2	0.0	0.0	0.0						2.4
C 727.50	0.0			0.0	0.1	0.1	0.2	0.2	0.1	0.2	0.1									1.1
H 712.50						0.0	0.1		0.0		0.0									0.2
697.50						0.0			0.0	0.1										0.1
682.50					0.1															0.1
	0.0	0.0	0.1	0.4	1.8	3.5	8.0	13.2	17.5	18.6	16.1	10.6	5.7	2.8	0.9	0.2	0.1	0.	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 4000.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	820.48	40.29	(0.457)*Y + (454.733)	37.56
Y-EYE HT/SITTING	799.59	31.87	(0.286)*X + (564.785)	29.71

***

CORRELATION COEFFICIENT 0.362 (BASED ON ORIGINAL DATA) 0.355 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.360	0.866	16+3982	-0.28
Y AS A FUNCTION OF X	0.362	1.235	17+3981	0.75

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND SEATED SHOULDER BREADTH

SEATED SHOULDER BREADTH

	374 .00	384 .00	394 .00	404 .00	414 .00	424 .00	434 .00	444 .00	454 .00	464 .00	474 .00	484 .00	494 .00	504 .00	514 .00	524 .00	534 .00	TOTAL
F 952.50						2			2		1							5
O 937.50								1	1	3	5		1	1	1			13
R 922.50					1	1	3	1	7	3	5	5	6	6		1	1	40
W 907.50					1	1	2	5	5	15	9	6	3	4				51
A 892.50					1	6	8	8	14	26	18	14	5	5			1	106
R 877.50				1	3	9	19	24	29	35	43	14	22	10	2	1	1	213
D 862.50			1	2	6	9	29	49	63	63	47	28	11	9	2	1		320
847.50		1	1	6	9	24	57	77	82	77	59	32	30	14	1	1		471
A 832.50			3	6	16	30	75	99	98	96	67	30	19	13	5	3		560
R 817.50			1	8	17	52	68	100	110	80	76	30	16	12		2		572
M 802.50		2	3	7	28	58	94	98	98	76	49	23	19	7	1	1		564
787.50		2	5	14	29	60	79	81	67	46	32	21	5	2			1	444
R 772.50			1	9	17	33	54	67	53	26	18	8	1	2				289
E 757.50				7	17	17	37	39	30	29	11	6	3	2				197
A 742.50			1	11	6	19	16	15	14	6	6	1						95
C 727.50				1	6	9	11	6	5	5		1						44
H 712.50	1	1				2	1		1		2							8
697.50			1				2			2								5
682.50						2	1											3
	1	6	17	72	157	334	556	669	679	588	448	219	141	87	12	10	4	4000

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	820.48	40.29	(0.572)*Y + (560.918)	38.13
Y-SHOULDER BREADTH	454.10	22.75	(0.182)*X + (304.562)	21.53

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CORRELATION COEFFICIENT 0.323 (BASED ON ORIGINAL DATA) 0.317 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.321	0.659	15+3983	-0.94
Y AS A FUNCTION OF X	0.327	1.685	17+3981	1.77

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND SEATED SHOULDER BREADTH

SEATED SHOULDER BREADTH

		374.00	384.00	394.00	404.00	414.00	424.00	434.00	444.00	454.00	464.00	474.00	434.00	494.00	504.00	514.00	524.00	534.00	TOTAL
F	952.50						0.0			0.0		0.0							0.1
O	937.50								0.0	0.0	0.1	0.1		0.0	0.0	0.0			0.3
R	922.50					0.0	0.0	0.1	0.0	0.2	0.1	0.1	0.1	0.1	0.1		0.0	0.0	1.0
W	907.50					0.0	0.0	0.0	0.1	0.1	0.4	0.2	0.1	0.1	0.1				1.3
A	892.50					0.0	0.1	0.2	0.2	0.3	0.6	0.4	0.3	0.1	0.1			0.0	2.6
R	877.50				0.0	0.1	0.2	0.5	0.6	0.7	0.9	1.1	0.3	0.5	0.2	0.0	0.0	0.0	5.3
D	862.50			0.0	0.0	0.1	0.2	0.7	1.2	1.6	1.6	1.2	0.7	0.3	0.2	0.0	0.0		8.0
	847.50		0.0	0.0	0.1	0.2	0.6	1.4	1.9	2.0	1.9	1.5	0.8	0.7	0.3	0.0	0.0		11.8
A	832.50			0.1	0.1	0.4	0.7	1.9	2.5	2.4	2.4	1.7	0.7	0.5	0.3	0.1	0.1		14.0
R	817.50			0.0	0.2	0.4	1.3	1.7	2.5	2.7	2.0	1.9	0.7	0.4	0.3		0.0		14.3
M	802.50		0.0	0.1	0.2	0.7	1.4	2.3	2.4	2.4	1.9	1.2	0.6	0.5	0.2	0.0	0.0		14.1
	787.50		0.0	0.1	0.3	0.7	1.5	2.0	2.0	1.7	1.1	0.8	0.5	0.1	0.0			0.0	11.1
R	772.50			0.0	0.2	0.4	0.8	1.3	1.7	1.3	0.6	0.4	0.2	0.0	0.0				7.2
E	757.50				0.2	0.4	0.4	0.9	0.9	0.7	0.7	0.3	0.1	0.1	0.0				4.9
A	742.50			0.0	0.3	0.1	0.5	0.4	0.4	0.3	0.1	0.1	0.0						2.4
C	727.50				0.0	0.1	0.2	0.3	0.1	0.1	0.1		0.0						1.1
H	712.50	0.0	0.0				0.0	0.0		0.0		0.0							0.2
	697.50			0.0				0.0			0.0								0.1
	682.50						0.0	0.0											0.1
		0.0	0.1	0.4	1.8	3.9	8.3	13.9	16.7	17.0	14.7	11.2	5.5	3.5	2.2	0.3	0.2	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 4000.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	820.48	40.29	(0.572)*Y + (560.918)	38.13
Y-SHOULDER BREADTH	454.10	22.75	(0.182)*X + (304.562)	21.53

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CORRELATION COEFFICIENT 0.323 (BASED ON ORIGINAL DATA) 0.317 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.321	0.659	15+3983	-0.94
Y AS A FUNCTION OF X	0.327	1.685	17+3981	1.77

BIVARIATE FREQUENCY TABLE FOR
BUTTOCK-KNEE LENGTH AND SEATED SHOULDER HEIGHT

SEATED SHOULDER HEIGHT

		484.00	494.00	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	644.00	654.00	664.00	674.00	684.00	TOTAL
B	705.00														1								1
U	695.00										1									1			2
T	685.00										1	1		1		1							4
T	675.00										1	3	3	3	2	2	3	1		1			19
O	665.00											2	5	1	4	6	6	3	3				30
C	655.00								1		6	4	14	10	6	8	9	2	3	1		1	65
K	645.00							2		2	13	17	18	27	22	21	9	10	4	1	1		147
-	635.00						1	6	3	9	19	26	22	44	32	17	17	13	8		2		219
K	625.00						3	7	11	18	39	39	62	57	45	24	28	15	5	2	1		356
N	615.00				2		5	11	17	37	52	68	85	80	62	45	28	21	3	2			518
E	605.00				2		7	14	34	38	65	80	100	97	52	47	22	17	5	3			583
E	595.00				4	4	17	15	40	53	80	81	85	74	64	41	25	4	6	5			598
	585.00			1	4	8	18	19	46	55	67	88	63	69	47	20	9	8	3	1	1		527
L	575.00			1	1	11	8	26	48	36	72	59	43	40	20	12	10	1		1			389
E	565.00			1	7	9	17	28	28	45	32	38	25	27	11	8	3	1					280
N	555.00	1		3	1	7	8	10	18	20	27	20	10	11	4		3						143
G	545.00			1	1	3	5	4	11	10	14	7	9	4									69
T	535.00					3	4	5	6	8	4	2	3	1									36
H	525.00				1	1	2	4				1	1										10
	515.00				1																		1
	505.00							1	1		1												3
		1	0	7	24	46	95	152	264	331	494	536	548	546	372	252	172	96	40	18	5	1	4000

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BUTTOCK-KNEE L'GTH	599.93	26.68	(0.382)*Y + (374.082)	24.36
Y-SHOULDER H'T/SIT.	590.86	28.46	(0.435)*X + (329.907)	25.99

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CORRELATION COEFFICIENT 0.408 (BASED ON ORIGINAL DATA) 0.404 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.409	0.951	18+3980	-0.04
Y AS A FUNCTION OF X	0.411	1.482	19+3979	1.40

BIVARIATE FREQUENCY TABLE FOR
BUTTOCK-KNEE LENGTH AND SEATED SHOULDER HEIGHT

SEATED SHOULDER HEIGHT

		484.00	494.00	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	644.00	654.00	664.00	674.00	684.00	TOTAL
B	705.00														0.0								0.0
U	695.00										0.0									0.0			0.0
T	685.00										0.0	0.0		0.0		0.0							0.1
T	675.00										0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0		0.0			0.5
O	665.00											0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1				0.7
C	655.00								0.0		0.1	0.1	0.3	0.2	0.1	0.2	0.2	0.0	0.1	0.0		0.0	1.6
K	645.00							0.0		0.0	0.3	0.4	0.4	0.7	0.5	0.5	0.2	0.2	0.1	0.0	0.0		3.7
-	635.00						0.0	0.1	0.1	0.2	0.5	0.6	0.5	1.1	0.8	0.4	0.4	0.3	0.2		0.0		5.5
K	625.00						0.1	0.2	0.3	0.4	1.0	1.0	1.5	1.4	1.1	0.6	0.7	0.4	0.1	0.0	0.0		8.9
N	615.00				0.0		0.1	0.3	0.4	0.5	1.3	1.7	2.1	2.0	1.5	1.1	0.7	0.5	0.1	0.0			12.9
E	605.00				0.0		0.2	0.3	0.8	0.9	1.6	2.0	2.5	2.4	1.3	1.2	0.5	0.4	0.1	0.1			14.6
E	595.00				0.1	0.1	0.4	0.4	1.0	1.3	2.0	2.0	2.1	1.8	1.6	1.0	0.6	0.1	0.1	0.1			14.0
	585.00			0.0	0.1	0.2	0.4	0.5	1.1	1.4	1.7	2.2	1.6	1.7	1.2	0.5	0.2	0.2	0.1	0.0	0.0		13.2
L	575.00			0.0	0.0	0.3	0.2	0.6	1.2	0.9	1.8	1.5	1.1	1.0	0.5	0.3	0.2	0.0		0.0			9.7
E	565.00			0.0	0.2	0.2	0.4	0.7	0.7	1.1	0.8	0.9	0.6	0.7	0.3	0.2	0.1	0.0					7.0
N	555.00	0.0		0.1	0.0	0.2	0.2	0.2	0.4	0.5	0.7	0.5	0.2	0.3	0.1		0.1						3.6
G	545.00			0.0	0.0	0.1	0.1	0.1	0.3	0.2	0.3	0.2	0.2	0.1									1.7
T	535.00					0.1	0.1	0.1	0.1	0.2	0.1	0.0	0.1	0.0									0.9
H	525.00				0.0	0.0	0.0	0.1				0.0	0.0										0.2
	515.00				0.0																		0.0
	505.00							0.0	0.0		0.0												0.1
		0.0	0.	0.2	0.6	1.1	2.4	3.8	6.6	8.3	12.3	13.4	13.7	13.6	9.3	6.3	4.3	2.4	1.0	0.4	0.1	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 4000.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BUTTOCK-KNEE L'GTH	599.93	26.68	(0.382)*Y + (374.082)	24.36
Y-SHOULDER H'T/SIT.	590.85	28.46	(0.435)*X + (329.907)	25.99

***

CORRELATION COEFFICIENT 0.408 (BASED ON ORIGINAL DATA) 0.404 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.409	0.951	18+3980	-0.04
Y AS A FUNCTION OF X	0.411	1.482	19+3979	1.40

BIVARIATE FREQUENCY TABLE FOR
BUTTOCK-KNEE LENGTH AND SEATED EYE HEIGHT

SEATED EYE HEIGHT

	667.50	682.50	697.50		727.50	742.50	757.50	772.50	787.50	802.50	817.50	832.50	847.50	862.50	877.50	892.50	907.50	922.50	937.50	TOTAL
B 705.00													1							1
U 695.00									1						1					2
T 685.00										2	1	1								4
T 675.00									1	4	3	5	5	1						19
O 665.00								2	1	4	1	8	6	8						30
C 655.00						1	2	1	7	14	10	15	8	4	2				1	65
K 645.00							3	9	16	23	27	34	12	15	5	2	1			147
- 635.00					1	4	6	17	29	31	41	36	28	17	8	1				219
K 625.00					1	2	16	32	52	72	70	53	35	15	5	1	2			356
N 615.00			1		3	12	22	52	87	99	120	64	40	12	6					518
E 605.00			1			13	44	61	96	130	109	73	30	23	3					583
E 595.00				2	1[illegible]	28	42	79	106	123	103	59	29	10	4	2	1			598
585.00				2	14		54	78	109	110	70	39	26	3	2	1				527
L 575.00				5	1[illegible]	17	[illegible]	77	70	63	48	18	8	5	1					389
E 565.00		1	1	2	14	4	4[illegible]	6[illegible]	55	40	29	17	2	1						280
N 555.00	1	1	1	4	4	[illegible]	25	3[illegible]	28	17	10	1			1					143
G 545.00				2	3	11	12	10	15	12	4									69
T 535.00			1		4	6	7	10	4	2		2								36
H 525.00				1	2	1	3	1	2											10
515.00					1															1
505.00							3													3
	1	2	5	18	72	141	322	529	699	746	646	425	230	114	38	7	4	0	1	4000

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BUTTOCK-KNEE L'GTH	599.93	26.68	(0.346)*Y + (323.130)	24.29
Y-EYE HT/SITTING	799.59	31.87	(0.494)*X + (503.252)	29.01

***

CORRELATION COEFFICIENT 0.414 (BASED ON ORIGINAL DATA) 0.408 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.411	0.629	16+3982	-1.09
Y AS A FUNCTION OF X	0.413	0.947	19+3979	-0.06

BIVARIATE FREQUENCY TABLE FOR
BUTTOCK-KNEE LENGTH AND SEATED EYE HEIGHT

SEATED EYE HEIGHT

	667.50	692.50	697.50	712.50	727.50	742.50	757.50	772.50	787.50	802.50	817.50	832.50	847.50	862.50	877.50	892.50	907.50	922.50	937.50	TOTAL
B 705.00													0.0							0.0
U 695.00									0.0						0.0					0.0
T 685.00										0.0	0.0	0.0								0.1
T 675.00									0.0	0.1	0.1	0.1	0.1	0.0						0.5
O 665.00								0.0	0.0	0.1	0.0	0.2	0.1	0.2						0.7
C 655.00						0.0	0.0	0.0	0.2	0.3	0.2	0.4	0.2	0.1	0.0				0.0	1.6
K 645.00							0.1	0.2	0.4	0.6	0.7	0.8	0.3	0.4	0.1	0.0	0.0			3.7
- 635.00					0.0	0.1	0.1	0.4	0.7	0.8	1.0	0.9	0.7	0.4	0.2	0.0				5.5
K 625.00					0.0	0.0	0.4	0.8	1.3	1.8	1.7	1.3	0.9	0.4	0.1	0.0	0.0			8.9
N 615.00			0.0		0.1	0.3	0.5	1.3	2.2	2.5	3.0	1.6	1.0	0.3	0.1					12.9
E 605.00			0.0			0.3	1.1	1.5	2.4	3.2	2.7	1.8	0.7	0.6	0.1					14.6
E 595.00				0.0	0.2	0.7	1.0	2.0	2.6	3.1	2.6	1.5	0.7	0.2	0.1	0.0	0.0			14.9
585.00				0.0	0.3	0.5	1.3	1.9	2.7	2.7	1.7	1.0	0.6	0.1	0.0	0.0				13.2
L 575.00				0.1	0.4	0.4	1.0	1.9	2.2	1.6	1.2	0.4	0.2	0.1	0.0					9.7
E 565.00		0.0	0.0	0.0	0.3	0.3	1.0	1.6	1.4	1.0	0.7	0.4	0.0	0.0						7.0
N 555.00	0.0	0.0	0.0	0.1	0.1	0.3	0.6	0.9	0.7	0.4	0.2	0.0			0.0					3.6
G 545.00				0.0	0.1	0.3	0.3	0.2	0.4	0.3	0.1									1.7
T 535.00			0.0		0.1	0.1	0.2	0.2	0.1	0.0		0.0								0.9
H 525.00				0.0	0.0	0.0	0.1	0.0	0.0											0.2
515.00					0.0															0.0
505.00							0.1													0.1
	0.0	0.0	0.1	0.4	1.8	3.5	8.0	13.2	17.5	13.6	16.1	10.6	5.7	2.8	0.9	0.2	0.1	0.	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 4000.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BUTTOCK-KNEE L'GTH	599.93	26.68	(0.346)*Y + (323.130)	24.29
Y-EYE HT/SITTING	799.59	31.87	(0.494)*X + (503.252)	29.01

***

CORRELATION COEFFICIENT 0.414 (BASED ON ORIGINAL DATA) 0.408 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.411	0.629	16+3982	-1.09
Y AS A FUNCTION OF X	0.413	0.947	19+3979	-0.06

BIVARIATE FREQUENCY TABLE FOR
BUTTOCK-KNEE LENGTH AND KNEE HEIGHT

KNEE HEIGHT

	454 .00	464 .00	474 .00	484 .00	494 .00	504 .00	514 .00	524 .00	534 .00	544 .00	554 .00	564 .00	574 .00	584 .00	594 .00	604 .00	614 .00	624 .00	634 .00	TOTAL
B 705.00																	1			1
U 695.00																1		1		2
T 685.00														1	1				2	4
T 675.00													1	2	7	2	4	3		19
O 665.00												1	3	3	2	11	8	2		30
C 655.00											2	2	12	15	17	11	6			65
K 645.00										1	4	15	31	52	21	13	8	2		147
- 635.00									1	4	22	40	69	40	30	11	2			219
K 625.00								1	6	24	67	79	98	61	17	3				356
N 615.00								7	21	77	132	132	92	44	12	1				518
E 605.00						1	4	15	73	130	149	125	61	18	7					583
E 595.00						4	18	49	123	165	124	81	26	8						598
585.00					1	11	30	90	136	147	84	26	2							527
L 575.00					4	16	61	101	113	53	31	8	2							389
E 565.00					11	30	77	73	64	18	6	1								280
N 555.00				1	13	35	48	36	8	2										143
G 545.00			1	5	11	21	23	4	4											69
T 535.00			1	6	11	10	6	2												36
H 525.00			2	1	4	3														10
515.00	1																			1
505.00		3																		3
	1	3	4	13	55	131	267	378	549	621	621	510	397	244	114	53	29	8	2	4000

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BUTTOCK-KNEE L'GTH	599.93	26.68	(0.994)*Y + (108.085)	14.86
Y-KNEE H'T/SITTING	550.42	24.79	(0.772)*X + (87.432)	13.81

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CORRELATION COEFFICIENT 0.830 (BASED ON ORIGINAL DATA) 0.821 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.822	0.927	17+3981	-0.10
Y AS A FUNCTION OF X	0.822	0.854	19+3979	-0.37

BIVARIATE FREQUENCY TABLE FOR
BUTTOCK-KNEE LENGTH AND KNEE HEIGHT

KNEE HEIGHT

		454 .00	464 .00	474 .00	484 .00	494 .00	504 .00	514 .00	524 .00	534 .00	544 .00	554 .00	564 .00	574 .00	584 .00	594 .00	604 .00	614 .00	624 .00	634 .00	TOTAL
B	705.00																	0.0			0.0
U	695.00																0.0		0.0		0.0
T	685.00														0.0	0.0				0.0	0.1
T	675.00													0.0	0.0	0.2	0.0	0.1	0.1		0.5
O	665.00												0.0	0.1	0.1	0.0	0.3	0.2	0.0		0.7
C	655.00											0.0	0.0	0.3	0.4	0.4	0.3	0.1			1.6
K	645.00										0.0	0.1	0.4	0.8	1.3	0.5	0.3	0.2	0.0		3.7
-	635.00									0.0	0.1	0.5	1.0	1.7	1.0	0.7	0.3	0.0			5.5
K	625.00								0.0	0.1	0.6	1.7	2.0	2.4	1.5	0.4	0.1				8.9
N	615.00								0.2	0.5	1.9	3.3	3.3	2.3	1.1	0.3	0.0				12.9
E	605.00						0.0	0.1	0.4	1.8	3.2	3.7	3.1	1.5	0.4	0.2					14.6
E	595.00						0.1	0.4	1.2	3.1	4.1	3.1	2.0	0.6	0.2						14.9
	585.00					0.0	0.3	0.7	2.2	3.4	3.7	2.1	0.6	0.0							13.2
L	575.00					0.1	0.4	1.5	2.5	2.8	1.3	0.8	0.2	0.0							9.7
E	565.00					0.3	0.7	1.9	1.8	1.6	0.4	0.1	0.0								7.0
N	555.00				0.0	0.3	0.9	1.2	0.9	0.2	0.0										3.6
G	545.00			0.0	0.1	0.3	0.5	0.6	0.1	0.1											1.7
T	535.00			0.0	0.1	0.3	0.2	0.1	0.0												0.9
H	525.00			0.0	0.0	0.1	0.1														0.2
	515.00	0.0																			0.0
	505.00		0.1																		0.1
		0.0	0.1	0.1	0.3	1.4	3.3	6.7	9.4	13.7	15.5	15.5	12.7	9.9	6.1	2.8	1.3	0.7	0.2	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 4000.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BUTTOCK-KNEE L'GTH	599.93	26.68	(0.894)*Y + (108.085)	14.86
Y-KNEE H'T/SITTING	550.42	24.79	(0.772)*X + (87.432)	13.81

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CORRELATION COEFFICIENT 0.830 (BASED ON ORIGINAL DATA) 0.821 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.822	0.927	17+3981	-0.10
Y AS A FUNCTION OF X	0.822	0.854	19+3979	-0.37

BIVARIATE FREQUENCY TABLE FOR
STATURE AND SEATED HEIGHT

SEATED HEIGHT

	772.50	787.50	802.50	817.50	832.50	847.50	862.50	877.50	892.50	907.50	922.50	937.50	952.50	967.50	982.50	997.50	1012.50	1027.50	TOTAL
1970.00																1		1	2
1950.00												1	1			1			3
1930.00													1	4	5	5	1		16
1910.00												4	1	8	4	5		1	23
1890.00										1		6	12	14	5	2	2	1	43
1870.00										1	10	14	22	23	19	7	1		97
1850.00									2	7	18	36	44	21	8	2	1		139
S1830.00								1	4	17	40	61	70	37	10	2			242
T1810.00								4	17	38	76	100	67	37	7	1			347
A1790.00							1	11	35	78	123	113	64	19	7				451
T1770.00						2	3	23	67	104	167	107	36	11					520
U1750.00						6	10	50	95	143	132	64	19	2	1				522
R1730.00					1	2	19	68	104	142	104	36	5						481
E1710.00				1	1	10	39	65	114	92	32	13	2						369
1690.00				1	3	17	38	73	85	49	23	6							295
1670.00					8	22	35	56	54	27	3	1							206
1650.00				2	3	16	36	41	16	2	2								118
1630.00				3	6	16	18	24	5	1									73
1610.00			3	2	5	4	11	3	1										29
1590.00				1	2	4	4	2											13
1570.00				1	3	2		1											7
1550.00						1													1
1530.00	1				1														2
1510.00					1														1
	1	0	3	11	34	102	214	422	599	702	730	562	344	176	66	26	5	3	4000

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1755.60	61.62	(1.466)*Y + (416.852)	39.49
Y-SITTING HEIGHT	913.04	32.26	(0.402)*X + (207.519)	20.67

***

CORRELATION COEFFICIENT 0.768 (BASED ON ORIGINAL DATA) 0.760 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.761	0.681	15+3983	-0.86
Y AS A FUNCTION OF X	0.762	1.073	22+3976	0.33

BIVARIATE FREQUENCY TABLE FOR
STATURE AND SEATED HEIGHT

SEATED HEIGHT

	772.50	787.50	802.50	817.50	832.50	847.50	862.50	877.50	892.50	907.50	922.50	937.50	952.50	967.50	982.50	997.50	1012.50	1027.50	TOTAL
1970.00																0.0		0.0	0.0
1950.00												0.0	0.0			0.0			0.1
1930.00													0.0	0.1	0.1	0.1	0.0		0.4
1910.00												0.1	0.0	0.2	0.1	0.1		0.0	0.6
1890.00										0.0		0.1	0.3	0.3	0.1	0.0	0.0	0.0	1.1
1870.00										0.0	0.2	0.3	0.5	0.6	0.5	0.2	0.0		2.4
1850.00									0.0	0.2	0.4	0.9	1.1	0.5	0.2	0.0	0.0		3.5
S1830.00								0.0	0.1	0.4	1.0	1.5	1.7	0.9	0.2	0.0			6.0
T1810.00								0.1	0.4	0.9	1.9	2.5	1.7	0.9	0.2	0.0			8.7
A1790.00							0.0	0.3	0.9	1.9	3.'	2.8	1.6	0.5	0.2				11.3
T1770.00						0.0	0.1	0.6	1.7	2.6	4.2	2.7	0.9	0.3					13.0
U1750.00						0.1	0.2	1.2	2.4	3.6	3.3	1.6	0.5	0.0	0.0				13.0
R1730.00					0.0	0.0	0.5	1.7	2.6	3.5	2.6	0.9	0.1						12.0
E1710.00				0.0	0.0	0.2	1.0	1.6	2.8	2.3	0.8	0.3	0.0						9.2
1690.00				0.0	0.1	0.4	0.9	1.8	2.1	1.2	0.6	0.1							7.4
1670.00					0.2	0.5	0.9	1.4	1.3	0.7	0.1	0.0							5.1
1650.00				0.0	0.1	0.4	0.9	1.0	0.4	0.0	0.0								2.9
1630.00				0.1	0.1	0.4	0.4	0.6	0.1	0.0									1.8
1610.00			0.1	0.0	0.1	0.1	0.3	0.1	0.0										0.7
1590.00				0.0	0.0	0.1	0.1	0.0											0.3
1570.00				0.0	0.1	0.0		0.0											0.2
1550.00						0.0													0.0
1530.00	0.0				0.0														0.0
1510.00					0.0														0.0
	0.0	0.	0.1	0.3	0.8	2.5	5.3	10.5	15.0	17.5	18.2	14.0	8.6	4.4	1.6	0.6	0.1	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 4000.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1755.60	61.62	(1.466)*Y + (416.852)	39.49
Y-SITTING HEIGHT	913.04	32.26	(0.402)*X + (207.519)	20.67

***

CORRELATION COEFFICIENT 0.768 (BASED ON ORIGINAL DATA) 0.760 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.761	0.681	15+3983	-0.86
Y AS A FUNCTION OF X	0.762	1.073	22+3976	0.33

BIVARIATE FREQUENCY TABLE FOR STATURE AND SEATED EYE HEIGHT

SEATED EYE HEIGHT

	667.50	682.50	697.50	712.50	727.50	742.50	757.50	772.50	787.50	802.50	817.50	832.50	847.50	862.50	877.50	892.50	907.50	922.50	937.50	TOTAL
1970.00															1				1	2
1950.00											1		1	1						3
1930.00												1	1	11	1		2			16
1910.00										1	1	2	7	8	4					23
1890.00									2	1	6	13	8	5	4	3	1			43
1870.00									2	7	12	22	21	17	13	2	1			97
1850.00								1	8	17	29	36	28	18	1	1				139
S1830.00							1	1	14	35	58	68	41	18	5	1				242
T1810.00							2	14	33	63	97	78	39	16	5					347
A1790.00						2	8	28	61	108	114	71	42	14	3					451
T1770.00						7	17	51	87	136	131	62	24	5						520
U1750.00					3	11	33	74	128	134	85	42	10	1	1					522
R1730.00						15	41	85	136	117	56	23	8							481
E1710.00				2	8	19	59	83	103	60	29	6								369
1690.00			1		8	25	55	82	59	43	21	1								295
1670.00			1	2	22	15	34	60	49	20	3									206
1650.00				2	13	19	37	32	10	3	2									118
1630.00			1	6	10	14	20	15	5	1	1									73
1610.00		2	1	4	2	10	6	2	2											29
1590.00				1	2	3	6	1												13
1570.00			1	1	1	1	3													7
1550.00					1															1
1530.00	1				1															2
1510.00					1															1
	1	2	5	18	72	141	322	529	699	746	646	425	230	114	38	7	4	0	1	4000

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1755.60	61.62	(1.374)*Y + (657.207)	43.36
Y-EYE HT/SITTING	799.59	31.87	(0.367)*X + (154.484)	22.43

***

CORRELATION COEFFICIENT 0.710 (BASED ON ORIGINAL DATA) 0.702 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.703	0.663	16+3982	-0.97
Y AS A FUNCTION OF X	0.704	1.305	22+3976	1.02

BIVARIATE FREQUENCY TABLE FOR
STATURE AND SEATED EYE HEIGHT

SEATED EYE HEIGHT

	667.50	682.50	697.50	712.50	727.50	742.50	757.50	772.50	787.50	802.50	817.50	832.50	847.50	862.50	877.50	892.50	907.50	922.50	937.50	TOTAL
1970.00															0.0				0.0	0.0
1950.00											0.0		0.0	0.0						0.1
1930.00												0.0	0.0	0.3	0.0		0.0			0.4
1910.00										0.0	0.0	0.0	0.2	0.2	0.1					0.6
1890.00									0.0	0.0	0.1	0.3	0.2	0.1	0.1	0.1	0.0			1.1
1870.00									0.0	0.2	0.3	0.5	0.5	0.4	0.3	0.0	0.0			2.4
1850.00								0.0	0.2	0.4	0.7	0.9	0.7	0.4	0.0	0.0				3.5
S1830.00							0.0	0.0	0.3	0.9	1.4	1.7	1.0	0.4	0.1	0.0				6.0
T1810.00							0.0	0.3	0.8	1.6	2.4	1.9	1.0	0.4	0.1					8.7
A1790.00						0.0	0.2	0.7	1.5	2.7	2.8	1.8	1.0	0.3	0.1					11.3
T1770.00						0.2	0.4	1.3	2.2	3.4	3.3	1.5	0.6	0.1						13.0
U1750.00					0.1	0.3	0.8	1.8	3.2	3.3	2.1	1.0	0.2	0.0	0.0					13.0
R1730.00						0.4	1.0	2.1	3.4	2.9	1.4	0.6	0.2							12.0
E1710.00				0.0	0.2	0.5	1.5	2.1	2.6	1.5	0.7	0.1								9.2
1690.00			0.0		0.2	0.6	1.4	2.0	1.5	1.1	0.5	0.0								7.4
1670.00			0.0	0.0	0.5	0.4	0.8	1.5	1.2	0.5	0.1									5.1
1650.00				0.0	0.3	0.5	0.9	0.8	0.2	0.1	0.0									2.9
1630.00			0.0	0.1	0.2	0.3	0.5	0.4	0.1	0.0	0.0									1.8
1610.00		0.0	0.0	0.1	0.0	0.2	0.1	0.0	0.0											0.7
1590.00				0.0	0.0	0.1	0.1	0.0												0.3
1570.00			0.0	0.0	0.0	0.0	0.1													0.2
1550.00					0.0															0.0
1530.00	0.0				0.0															0.0
1510.00					0.0															0.0
	0.0	0.0	0.1	0.4	1.8	3.5	8.0	13.2	17.5	18.6	16.1	10.6	5.7	2.8	0.9	0.2	0.1	0.	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 4000.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1755.60	61.62	(1.374)*Y + (657.207)	43.36
Y-EYE HT/SITTING	799.59	31.87	(0.367)*X + (154.484)	22.43

***

CORRELATION COEFFICIENT 0.710 (BASED ON ORIGINAL DATA) 0.702 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.703	0.663	16+3982	-0.97
Y AS A FUNCTION OF X	0.704	1.305	22+3976	1.02

BIVARIATE FREQUENCY TABLE FOR
STATURE AND KNEE HEIGHT

KNEE HEIGHT

	454.00	464.00	474.00	484.00	494.00	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	TOTAL
1970.00																	1	1		2
1950.00																	1	1	1	3
1930.00														1	1	6	5	3		16
1910.00												1		1	5	8	5	2	1	23
1890.00												2	2	10	11	11	7			43
1870.00												3	15	32	24	15	7	1		97
1850.00											3	15	31	46	34	7	3			139
S1830.00									1	4	19	43	84	62	24	5				242
T1810.00								2	5	18	48	108	109	44	12	1				347
A1790.00								3	10	46	124	144	87	34	3					451
T1770.00								13	51	124	156	112	51	13						520
U1750.00						1	5	21	88	174	163	54	15	1						522
R1730.00					1	4	18	55	160	140	78	22	3							481
E1710.00						6	36	99	117	83	24	4								369
1690.00					2	14	69	96	81	25	6	2								295
1670.00					7	41	70	57	24	7										206
1650.00					12	37	35	23	11											118
1630.00				4	14	16	31	7	1											73
1610.00			1	5	9	9	3	2												29
1590.00		1	2	2	6	2														13
1570.00		2		1	3	1														7
1550.00			1																	1
1530.00				1	1															2
1510.00	1																			1
	1	3	4	13	55	131	267	378	549	621	621	510	397	244	114	53	29	8	2	4000

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1755.60	61.62	(2.195)*Y + (547.479)	25.90
Y-KNEE H'T/SITTING	550.42	24.79	(0.355)*X + (-73.468)	11.63

***

CORRELATION COEFFICIENT 0.883 (BASED ON ORIGINAL DATA) 0.873 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.873	0.837	17+3981	-0.39
Y AS A FUNCTION OF X	0.874	0.914	22+3976	-0.19

BIVARIATE FREQUENCY TABLE FOR
STATURE AND KNEE HEIGHT

KNEE HEIGHT

	454.00	464.00	474.00	484.00	494.00	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	TOTAL
1970.00																	0.0	0.0		0.0
1950.00																	0.0	0.0	0.0	0.1
1930.00														0.0	0.0	0.1	0.1	0.1		0.4
1910.00												0.0		0.0	0.1	0.2	0.1	0.0	0.0	0.6
1890.00												0.0	0.0	0.2	0.3	0.3	0.2			1.1
1870.00												0.1	0.4	0.8	0.6	0.4	0.2	0.0		2.4
1850.00											0.1	0.4	0.8	1.1	0.8	0.2	0.1			3.5
S1830.00									0.0	0.1	0.5	1.1	2.1	1.5	0.6	0.1				6.0
T1810.00								0.0	0.1	0.4	1.2	2.7	2.7	1.1	0.3	0.0				8.7
A1790.00								0.1	0.2	1.1	3.1	3.6	2.2	0.8	0.1					11.3
T1770.00								0.3	1.3	3.1	3.9	2.8	1.3	0.3						13.0
U1750.00						0.0	0.1	0.5	2.2	4.3	4.1	1.3	0.4	0.0						13.0
R1730.00					0.0	0.1	0.4	1.4	4.0	3.5	1.9	0.5	0.1							12.0
E1710.00						0.1	0.9	2.5	2.9	2.1	0.6	0.1								9.2
1690.00					0.0	0.3	1.7	2.4	2.0	0.6	0.1	0.0								7.4
1670.00					0.2	1.0	1.7	1.4	0.6	0.2										5.1
1650.00					0.3	0.9	0.9	0.6	0.3											2.9
1630.00				0.1	0.3	0.4	0.8	0.2	0.0											1.8
1610.00			0.0	0.1	0.2	0.2	0.1	0.0												0.7
1590.00		0.0	0.0	0.0	0.1	0.0														0.3
1570.00		0.0		0.0	0.1	0.0														0.2
1550.00			0.0																	0.0
1530.00				0.0	0.0															0.0
1510.00	0.0																			0.0
	0.0	0.1	0.1	0.3	1.4	3.3	6.7	9.4	13.7	15.5	15.5	12.7	9.9	6.1	2.8	1.3	0.7	0.2	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 4000.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1755.60	61.62	(2.195)*Y + (547.479)	28.90
Y-KNEE H'T/SITTING	550.42	24.79	(0.355)*X + (-73.468)	11.63

***

CORRELATION COEFFICIENT 0.883 (BASED ON ORIGINAL DATA) 0.873 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.873	0.837	17+3981	-0.39
Y AS A FUNCTION OF X	0.874	0.914	22+3976	-0.19

BIVARIATE FREQUENCY TABLE FOR
STATURE AND BUTTOCK-KNEE LENGTH

BUTTOCK-KNEE LENGTH

	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	644.00	654.00	664.00	674.00	684.00	694.00	704.00	TOTAL
1970.00																1				1		2
1950.00																	1		1		1	3
1930.00													1	1	5	2	5	2				16
1910.00														3	5	4	5	4	2			23
1890.00										2			1	6	14	9	7	3		1		43
1870.00											5	4	21	24	24	9	6	4				97
1850.00										3	5	26	32	24	24	16	4	4	1			139
S1830.00									2	9	31	54	54	47	29	14		2				242
T1810.00								1	11	33	62	85	70	57	21	5	2					347
A1790.00							3	17	23	65	99	124	80	23	14	3						451
T1770.00						1	7	19	62	111	137	99	52	21	9	2						520
U1750.00						3	12	35	91	137	122	78	33	10	1							522
R1730.00				1	1	4	32	75	128	114	75	37	10	3	1							481
E1710.00					1	12	51	82	96	80	38	7	2									369
1690.00				1	9	24	64	82	70	35	7	3										295
1670.00				6	19	39	58	43	30	8	2	1										206
1650.00				5	14	32	32	24	10	1												118
1630.00			2	9	15	19	16	9	3													73
1610.00			3	5	6	8	5	2														29
1590.00	1		2	6	3				1													13
1570.00	2		1	3	1																	7
1550.00			1																			1
1530.00			1			1																2
1510.00		1																				1
	3	1	10	36	69	143	280	389	527	598	583	518	356	219	147	65	30	19	4	2	1	4000

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1755.60	61.62	(1.903)*Y + (613.928)	34.91
Y-BUTTOCK-KNEE L'GTH	599.93	26.68	(0.357)*X + (-26.390)	15.12

***

CORRELATION COEFFICIENT 0.824 (BASED ON ORIGINAL DATA) 0.815 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.817	1.569	19+3979	1.60
Y AS A FUNCTION OF X	0.817	1.347	22+3976	1.14

BIVARIATE FREQUENCY TABLE FOR
STATURE AND BUTTOCK-KNEE LENGTH

BUTTOCK-KNEE LENGTH

	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	644.00	654.00	664.00	674.00	684.00	694.00	704.00	TOTAL
1970.00																0.0				0.0		0.0
1950.00																	0.0		0.0		0.0	0.1
1930.00													0.0	0.0	0.1	0.0	0.1	0.0				0.4
1910.00														0.1	0.1	0.1	0.1	0.1	0.0			0.6
1890.00										0.0			0.0	0.1	0.3	0.2	0.2	0.1		0.0		1.1
1870.00											0.1	0.1	0.5	0.6	0.6	0.2	0.1	0.1				2.4
1850.00										0.1	0.1	0.6	0.8	0.6	0.6	0.4	0.1	0.1	0.0			3.5
S1830.00									0.0	0.2	0.8	1.3	1.3	1.2	0.7	0.3		0.0				6.0
T1810.00								0.0	0.3	0.8	1.5	2.1	1.7	1.4	0.5	0.1	0.0					8.7
A1790.00							0.1	0.4	0.6	1.6	2.5	3.1	2.0	0.6	0.3	0.1						11.3
T1770.00						0.0	0.2	0.5	1.5	2.8	3.4	2.5	1.3	0.5	0.2	0.0						13.0
U1750.00						0.1	0.3	0.9	2.3	3.4	3.0	1.9	0.8	0.2	0.0							13.0
R1730.00				0.0	0.0	0.1	0.8	1.9	3.2	2.8	1.9	0.9	0.2	0.1	0.0							12.0
E1710.00					0.0	0.3	1.3	2.0	2.4	2.0	0.9	0.2	0.0									9.2
1690.00				0.0	0.2	0.6	1.6	2.0	1.7	0.9	0.2	0.1										7.4
1670.00				0.1	0.5	1.0	1.4	1.1	0.7	0.2	0.0	0.0										5.1
1650.00				0.1	0.3	0.8	0.8	0.6	0.2	0.0												2.9
1630.00			0.0	0.2	0.4	0.5	0.4	0.2	0.1													1.8
1610.00			0.1	0.1	0.1	0.2	0.1	0.0														0.7
1590.00	0.0		0.0	0.1	0.1				0.0													0.3
1570.00	0.0		0.0	0.1	0.0																	0.2
1550.00			0.0																			0.0
1530.00			0.0			0.0																0.0
1510.00		0.0																				0.0
																						0.0
	0.1	0.0	0.2	0.9	1.7	3.6	7.0	9.7	13.2	14.9	14.6	12.9	8.9	5.5	3.7	1.6	0.7	0.5	0.1	0.0	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 4000.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1755.60	61.62	(1.903)*Y + (613.928)	34.91
Y-BUTTOCK-KNEE L'GTH	599.93	26.68	(0.357)*X + (-26.390)	15.12

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CORRELATION COEFFICIENT 0.824 (BASED ON ORIGINAL DATA) 0.815 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.817	1.569	19+3979	1.60
Y AS A FUNCTION OF X	0.817	1.347	22+3976	1.14

BIVARIATE FREQUENCY TABLE FOR
STATURE AND SEATED SHOULDER BREADTH

SEATED SHOULDER BREADTH

	374.00	384.00	394.00	404.00	414.00	424.00	434.00	444.00	454.00	464.00	474.00	484.00	494.00	504.00	514.00	524.00	534.00	TOTAL
1970.00									1		1							2
1950.00											2			1				3
1930.00						2	2	1	3	2			5	1				16
1910.00				1			2	1	1	3	11	1	3					23
1890.00				2	1	2	3	4	6	6	9	5	3	2				43
1870.00						2	7	10	12	24	18	8	8	5	2		1	97
1850.00			1		3	5	15	13	23	28	24	12	7	8				139
S1830.00				4	2	7	21	38	35	43	41	20	16	10	3	1	1	242
T1810.00		2	1	4	7	15	43	53	63	52	46	24	21	12	1	3		347
A1790.00				2	10	31	53	61	78	71	66	39	25	11	2	2		451
T1770.00			1	4	16	33	56	107	100	81	67	31	11	10	2	1		520
U1750.00			1	4	21	33	69	92	100	88	63	25	12	12		2		522
R1730.00		1	3	9	29	52	75	73	86	65	40	18	16	11	1	1	2	481
E1710.00		1	2	10	15	40	69	62	65	48	27	22	7	1				369
1690.00	1		4	8	19	44	49	60	42	40	17	5	4	2				295
1670.00			3	9	16	30	42	46	23	19	10	5	1	1	1			206
1650.00		1		9	5	13	29	29	16	10	2	3	1					118
1630.00			1	5	10	11	14	9	14	6	2		1					73
1610.00				2	1	5	5	6	7	1	1	1						29
1590.00					1	4	1	4	2	1								13
1570.00		1			1	2			2		1							7
1550.00						1												1
1530.00						1	1											2
1510.00						1												1
	1	6	17	72	157	334	556	669	679	588	448	219	141	87	12	10	4	4000

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1755.60	61.62	(0.872)*Y + (1359.515)	58.33
Y-SHOULDER BREADTH	454.10	22.75	(0.119)*X + (245.342)	21.54

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CORRELATION COEFFICIENT 0.322 (BASED ON ORIGINAL DATA) 0.313 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.320	1.271	15+3983	0.80
Y AS A FUNCTION OF X	0.322	1.097	22+3976	0.41

BIVARIATE FREQUENCY TABLE FOR
STATURE AND SEATED SHOULDER BREADTH

SEATED SHOULDER BREADTH

	374.00	384.00	394.00	404.00	414.00	424.00	434.00	444.00	454.00	464.00	474.00	484.00	494.00	504.00	514.00	524.00	534.00	TOTAL
1970.00									0.0		0.0							0.0
1950.00											0.0			0.0				0.1
1930.00						0.0	0.0	0.0	0.1	0.0			0.1	0.0				0.4
1910.00				0.0			0.0	0.0	0.0	0.1	0.3	0.0	0.1					0.6
1890.00				0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.0				1.1
1870.00						0.0	0.2	0.2	0.3	0.6	0.4	0.2	0.2	0.1	0.0		0.0	2.4
1850.00			0.0		0.1	0.1	0.4	0.3	0.6	0.7	0.6	0.3	0.2	0.2				3.5
S1830.00				0.1	0.0	0.2	0.5	0.9	0.9	1.1	1.0	0.5	0.4	0.2	0.1	0.0	0.0	6.0
T1810.00		0.0	0.0	0.1	0.2	0.4	1.1	1.3	1.6	1.3	1.1	0.6	0.5	0.3	0.0	0.1		8.7
A1790.00				0.0	0.2	0.8	1.3	1.5	1.9	1.8	1.6	1.0	0.6	0.3	0.0	0.0		11.3
T1770.00			0.0	0.1	0.4	0.8	1.4	2.7	2.5	2.0	1.7	0.8	0.3	0.2	0.0	0.0		13.0
U1750.00			0.0	0.1	0.5	0.8	1.7	2.3	2.5	2.2	1.6	0.6	0.3	0.3		0.0		13.0
R1730.00		0.0	0.1	0.2	0.7	1.3	1.9	1.8	2.1	1.6	1.0	0.4	0.4	0.3	0.0	0.0	0.0	12.0
E1710.00		0.0	0.0	0.2	0.4	1.0	1.7	1.5	1.6	1.2	0.7	0.5	0.2	0.0				9.2
1690.00	0.0		0.1	0.2	0.5	1.1	1.2	1.5	1.0	1.0	0.4	0.1	0.1	0.0				7.4
1670.00			0.1	0.2	0.4	0.7	1.0	1.1	0.6	0.5	0.2	0.1	0.0	0.0	0.0			5.1
1650.00		0.0		0.2	0.1	0.3	0.7	0.7	0.4	0.2	0.0	0.1	0.0					2.9
1630.00			0.0	0.1	0.2	0.3	0.3	0.2	0.3	0.1	0.0		0.0					1.8
1610.00				0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.0						0.7
1590.00					0.0	0.1	0.0	0.1	0.0	0.0								0.3
1570.00		0.0			0.0	0.0			0.0		0.0							0.2
1550.00						0.0												0.0
1530.00						0.0	0.0											0.0
1510.00						0.0												0.0
	0.0	0.1	0.4	1.8	3.9	8.3	13.9	16.7	17.0	14.7	11.2	5.5	3.5	2.2	0.3	0.2	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 4000.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1755.60	61.62	(0.872)*Y + (1359.515)	58.33
Y-SHOULDER BREADTH	454.10	22.75	(0.119)*X + (245.342)	21.54

***

CORRELATION COEFFICIENT 0.322 (BASED ON ORIGINAL DATA) 0.313 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.320	1.271	15+3983	0.80
Y AS A FUNCTION OF X	0.322	1.097	22+3976	0.41

BIVARIATE FREQUENCY TABLE FOR
STATURE AND SHOULDER-ELBOW LENGTH

SHOULDER-ELBOW LENGTH

	294 .00	304 .00	314 .00	324 .00	334 .00	344 .00	354 .00	364 .00	374 .00	384 .00	394 .00	404 .00	414 .00	424 .00	434 .00	TOTAL
1970.00												1			1	2
1950.00									1			2				3
1930.00										4	6	4	2			16
1910.00									3	5	9	4	2			23
1890.00								2	3	13	17	6	2			43
1870.00							1	5	16	32	29	13	1			97
1850.00						1	3	16	40	51	25	3				139
S1830.00					3	3	13	37	69	73	37	5	2			242
T1810.00					1	7	36	85	101	99	17	1				347
A1790.00					5	10	58	140	156	62	18	2				451
T1770.00				1	7	31	126	156	130	55	13	1				520
U1750.00				2	9	61	136	181	97	29	6	1				522
R1730.00				1	31	78	197	114	54	6						481
E1710.00				7	35	90	119	93	22	2	1					369
1690.00			2	12	43	100	87	41	10							295
1670.00			2	18	43	74	45	19	4	1						206
1650.00		1	1	17	40	39	16	4								118
1630.00			2	12	32	16	10	1								73
1610.00			5	8	7	8	1									29
1590.00		1	1	6	4	1										13
1570.00	1	2	1	1	1	1										7
1550.00			1													1
1530.00			1		1											2
1510.00		1														1
	1	5	16	85	262	520	848	894	706	432	178	43	9	0	1	4000

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1755.60	61.62	(2.698)*Y + (774.346)	40.64
Y-SHOULDER-ELBOW L'H	363.68	17.16	(0.209)*X + (-3.881)	11.32

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CORRELATION COEFFICIENT 0.752 (BASED ON ORIGINAL DATA) 0.736 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.736	0.723	12+3986	-0.62
Y AS A FUNCTION OF X	0.737	0.952	22+3976	-0.06

BIVARIATE FREQUENCY TABLE FOR
STATURE AND SHOULDER-ELBOW LENGTH

SHOULDER-ELBOW LENGTH

	294 .00	304 .00	314 .00	324 .00	334 .00	344 .00	354 .00	364 .00	374 .00	384 .00	394 .00	404 .00	414 .00	424 .00	434 .00	TOTAL
1970.00												0.0			0.0	0.0
1950.00									0.0			0.0				0.1
1930.00										0.1	0.1	0.1	0.0			0.4
1910.00									0.1	0.1	0.2	0.1	0.0			0.6
1890.00								0.0	0.1	0.3	0.4	0.1	0.0			1.1
1870.00							0.0	0.1	0.4	0.8	0.7	0.3	0.0			2.4
1850.00						0.0	0.1	0.4	1.0	1.3	0.6	0.1				3.5
S1830.00					0.1	0.1	0.3	0.9	1.7	1.8	0.9	0.1	0.0			6.0
T1810.00					0.0	0.2	0.9	2.1	2.5	2.5	0.4	0.0				8.7
A1790.00					0.1	0.2	1.4	3.5	3.9	1.5	0.4	0.0				11.3
T1770.00				0.0	0.2	0.8	3.1	3.9	3.2	1.4	0.3	0.0				13.0
U1750.00				0.0	0.2	1.5	3.4	4.5	2.4	0.7	0.1	0.0				13.0
R1730.00				0.0	0.8	1.9	4.9	2.8	1.3	0.1						12.0
E1710.00				0.2	0.9	2.2	3.0	2.3	0.5	0.0	0.0					9.2
1690.00			0.0	0.3	1.1	2.5	2.2	1.0	0.2							7.4
1670.00			0.0	0.4	1.1	1.8	1.1	0.5	0.1	0.0						5.1
1650.00		0.0	0.0	0.4	1.0	1.0	0.4	0.1								2.9
1630.00			0.0	0.3	0.8	0.4	0.2	0.0								1.8
1610.00			0.1	0.2	0.2	0.2	0.0									0.7
1590.00		0.0	0.0	0.1	0.1	0.0										0.3
1570.00	0.0	0.0	0.0	0.0	0.0	0.0										0.2
1550.00			0.0													0.0
1530.00			0.0		0.0											0.0
1510.00		0.0														0.0
	0.0	0.1	0.4	2.1	6.5	13.0	21.2	22.3	17.6	10.8	4.4	1.1	0.2	0.	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 4000.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1755.60	61.62	(2.698)*Y + (774.346)	40.64
Y-SHOULDER-ELBOW L'H	363.68	17.16	(0.209)*X + (-3.881)	11.32

***

CORRELATION COEFFICIENT 0.752 (BASED ON ORIGINAL DATA) 0.736 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.736	0.723	12+3986	-0.62
Y AS A FUNCTION OF X	0.737	0.952	22+3976	-0.06

BIVARIATE FREQUENCY TABLE FOR
SEATED SHOULDER HT AND KNEE HEIGHT

KNEE HEIGHT

	454 .00	464 .00	474 .00	484 .00	494 .00	504 .00	514 .00	524 .00	534 .00	544 .00	554 .00	564 .00	574 .00	584 .00	594 .00	604 .00	614 .00	624 .00	634 .00	TOTAL
685.00																	1			1
S 675.00											1	1	1	1	1					5
E 665.00								1	1	2	3	4		4	1			2		18
A 655.00								2	1	3	2	7	6	8	5	5	1			40
T 645.00								2	4	9	13	18	18	11	10	7		4		96
E 635.00						1	2	6	9	17	31	33	31	19	10	10	3			172
D 625.00							4	10	27	32	43	34	44	28	16	8	5	1		252
615.00						2	8	12	40	70	54	67	50	40	15	7	7			372
S 605.00				1	2	9	22	32	63	91	104	79	70	41	22	4	4	1	1	546
H 595.00					5	11	22	41	69	104	98	78	56	39	13	7	5			548
O 585.00				1	6	16	34	54	94	99	93	55	54	26	11		2		1	536
U 575.00		1			5	27	44	63	84	70	83	58	31	14	8	5	1			494
L 565.00				1	11	20	32	55	66	48	44	27	18	8	1					331
D 555.00		1		3	7	13	43	44	45	42	26	27	9	3	1					264
E 545.00		1	1	5	6	13	17	26	24	19	17	15	6	2						152
R 535.00			3		7	11	15	16	20	8	7	5	3							95
525.00				1	2	7	14	10	8	4										46
H 515.00	1			1	2	1	6	4	3	2	2	2								24
T 505.00					1		4		1	1										7
495.00																				0
485.00					1															1
	1	3	4	13	55	131	267	378	549	621	621	510	397	244	114	53	29	8	2	4000

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-SHOULDER H'T/SIT.	590.86	28.46	(0.531)*Y + (298.590)	25.23
Y-KNEE H'T/SITTING	550.42	24.79	(0.403)*X + (312.308)	21.98

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CORRELATION COEFFICIENT 0.463 (BASED ON ORIGINAL DATA) 0.456 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.462	1.726	17+3981	1.85
Y AS A FUNCTION OF X	0.459	0.718	18+3980	-0.83

BIVARIATE FREQUENCY TABLE FOR
SEATED SHOULDER HT AND KNEE HEIGHT

KNEE HEIGHT

	454 .00	464 .00	474 .00	484 .00	494 .00	504 .00	514 .00	524 .00	534 .00	544 .00	554 .00	564 .00	574 .00	584 .00	594 .00	604 .00	614 .00	624 .00	634 .00	TOTAL
685.00																	0.0			0.0
S 675.00											0.0	0.0	0.0	0.0	0.0					0.1
E 665.00								0.0	0.0	0.0	0.1	0.1		0.1	0.0			0.0		0.4
A 655.00								0.0	0.0	0.1	0.0	0.2	0.1	0.2	0.1	0.1	0.0			1.0
T 645.00								0.0	0.1	0.2	0.3	0.4	0.4	0.3	0.2	0.2		0.1		2.4
E 635.00						0.0	0.0	0.1	0.2	0.4	0.8	0.8	0.8	0.5	0.2	0.2	0.1			4.3
D 625.00							0.1	0.2	0.7	0.8	1.1	0.8	1.1	0.7	0.4	0.2	0.1	0.0		6.3
615.00						0.0	0.2	0.3	1.0	1.7	1.3	1.7	1.2	1.0	0.4	0.2	0.2			9.3
S 605.00				0.0	0.0	0.2	0.5	0.8	1.6	2.3	2.6	2.0	1.7	1.0	0.5	0.1	0.1	0.0	0.0	13.6
H 595.00					0.1	0.3	0.5	1.0	1.7	2.6	2.4	1.9	1.4	1.0	0.3	0.2	0.1			13.7
O 585.00				0.0	0.1	0.4	0.8	1.3	2.1	2.5	2.3	1.4	1.3	0.6	0.3		0.0		0.0	13.4
U 575.00		0.0			0.1	0.7	1.1	1.6	2.1	1.7	2.1	1.4	0.8	0.3	0.2	0.1	0.0			12.3
L 565.00				0.0	0.3	0.5	0.8	1.4	1.6	1.2	1.1	0.7	0.4	0.2	0.0					8.3
D 555.00		0.0		0.1	0.2	0.3	1.1	1.1	1.1	1.0	0.6	0.7	0.2	0.1	0.0					6.6
E 545.00		0.0	0.0	0.1	0.1	0.3	0.4	0.6	0.6	0.5	0.4	0.4	0.1	0.0						3.8
R 535.00			0.1		0.2	0.3	0.4	0.4	0.5	0.2	0.2	0.1	0.1							2.4
525.00				0.0	0.0	0.2	0.3	0.2	0.2	0.1										1.1
H 515.00	0.0			0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0								0.6
T 505.00					0.0		0.1		0.0	0.0										0.2
495.00																				0.
485.00					0.0															0.0
	0.0	0.1	0.1	0.3	1.4	3.3	6.7	9.4	13.7	15.5	15.5	12.7	9.9	6.1	2.8	1.3	0.7	0.2	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 4000.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-SHOULDER H'T/SIT.	590.86	28.46	(0.531)*Y + (298.590)	25.23
Y-KNEE H'T/SITTING	550.42	24.79	(0.403)*X + (312.308)	21.98

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CORRELATION COEFFICIENT 0.463 (BASED ON ORIGINAL DATA) 0.456 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.462	1.726	17+3981	1.85
Y AS A FUNCTION OF X	0.459	0.718	18+3980	-0.83

BIVARIATE FREQUENCY TABLE FOR
SEATED SHOULDER HT AND SEATED EYE HEIGHT

SEATED EYE HEIGHT

SEATED SHOULDER HT	667 .50	682 .50	697 .50	712 .50	727 .50	742 .50	757 .50	772 .50	787 .50	802 .50	817 .50	832 .50	847 .50	862 .50	877 .50	892 .50	907 .50	922 .50	937 .50	TOTAL
685.00																			1	1
675.00													1	2	2					5
665.00											2	2		5	7		2			18
655.00										1	2	5	8	15	7	2				40
645.00										1	9	23	27	26	8	1	1			96
635.00									4	9	24	40	58	26	8	2	1			172
625.00							1		7	33	58	81	44	22	4	2				252
615.00								3	21	74	114	94	53	11	2					372
605.00							3	22	66	145	179	96	29	6						546
595.00						2	12	39	119	186	132	50	7	1						548
585.00					1	3	29	83	153	154	82	28	3							536
575.00					3	12	50	130	171	85	37	6								494
565.00				1	2	26	60	111	84	42	5									331
555.00			1		12	24	72	86	52	15	2									264
545.00			2	1	11	31	47	41	18	1										152
535.00			1	2	13	28	36	11	4											95
525.00		1	1	7	18	9	8	2												46
515.00				4	9	6	4	1												24
505.00		1		3	3															7
495.00																				0
485.00	1																			1
	1	2	5	18	72	141	322	529	699	746	646	425	230	114	38	7	4	0	1	4000

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-SHOULDER H'T/SIT.	590.56	28.46	(0.731)*Y + (6.513)	16.36
Y-EYE HT/SITTING	799.59	31.87	(0.916)*X + (258.160)	18.32

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CORRELATION COEFFICIENT 0.818 (BASED ON ORIGINAL DATA) 0.807 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.809	1.869	16+3982	2.08
Y AS A FUNCTION OF X	0.809	1.461	18+3980	1.32

BIVARIATE FREQUENCY TABLE FOR
SEATED SHOULDER HT AND SEATED EYE HEIGHT

SEATED EYE HEIGHT

	667.50	682.50	697.50	712.50	727.50	742.50	757.50	772.50	787.50	802.50	817.50	832.50	847.50	862.50	877.50	892.50	907.50	922.50	937.50	TOTAL
685.00																			0.0	0.C
S 675.00													0.0	0.0	0.0					0.1
E 665.00											0.0	0.0		0.1	0.2		0.0			0.4
A 655.00										0.0	0.C	0.1	0.2	0.4	0.2	0.0				1.C
T 645.00										0.0	0.2	0.6	0.7	0.6	0.2	0.0	0.0			2.4
E 635.00									0.1	0.2	0.6	1.0	1.4	0.6	0.2	C.C	0.0			4.3
D 625.00							0.0		0.2	0.8	1.4	2.0	1.1	0.5	0.1	0.0				6.3
615.00								0.1	0.5	1.8	2.8	2.3	1.3	0.3	0.0					9.3
S 605.00							0.1	0.5	1.6	3.6	4.5	2.4	0.7	0.1						13.6
H 595.00						0.0	0.3	1.0	3.0	4.6	3.3	1.2	0.2	0.0						13.7
O 585.00					0.0	0.1	0.7	2.1	3.8	3.8	2.0	0.7	0.1							13.4
U 575.00					0.1	0.3	1.2	3.2	4.3	2.1	0.9	0.1								12.3
L 565.00				C.0	0.C	0.6	1.5	2.8	2.1	1.0	0.1									8.3
D 555.00			0.0		C.3	0.6	1.8	2.1	1.3	0.4	0.0									6.6
E 545.00			0.0	0.C	0.3	0.8	1.2	1.C	0.4	0.0										3.8
R 535.00			0.0	0.0	0.3	0.7	0.9	0.3	0.1											2.4
525.00		0.0	0.0	0.2	0.4	0.2	0.2	0.0												1.1
H 515.00				C.1	0.2	0.1	0.1	0.0												0.6
T 505.00		0.0		0.1	0.1															0.2
495.00																				0.
485.00	0.0																			0.0
	0.0	0.0	C.1	0.4	1.8	3.5	8.0	13.2	17.5	18.6	16.1	10.6	5.7	2.8	0.9	0.2	0.1	0.	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 4000.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-SHOULDER H'T/SIT.	590.86	28.46	(0.731)*Y + (6.513)	16.36
Y-EYE HT/SITTING	799.59	31.87	(0.916)*X + (258.160)	18.32

***

CORRELATION COEFFICIENT 0.818 (BASED ON ORIGINAL DATA) 0.807 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.809	1.869	16+3982	2.08
Y AS A FUNCTION OF X	0.809	1.461	18+3980	1.32

BIVARIATE FREQUENCY TABLE FOR
SEATED SHOULDER HT AND SEATED SHOULDER BREADTH

SEATED SHOULDER BREADTH

	374.00	384.00	394.00	404.00	414.00	424.00	434.00	444.00	454.00	464.00	474.00	484.00	494.00	504.00	514.00	524.00	534.00	TOTAL
685.00											1							1
S 675.00						1			1		2	1						5
E 665.00				1		1	3	4	4	1		2	1		1			18
A 655.00		1			1		4	4	6	7	11	1	2	3				40
T 645.00				2		2	10	10	8	21	22	9	6	4	1		1	96
E 635.00				3	2	7	13	25	25	38	23	15	13	6	1	1		172
D 625.00			1	2	4	13	24	38	52	37	27	20	19	11	2	1	1	252
615.00		1	2	3	10	20	35	58	68	60	47	32	18	13	1	4		372
S 605.00			3	6	15	46	54	77	90	97	89	27	23	16	1	2		546
H 595.00			1	9	20	35	87	86	86	86	60	38	24	14	1		1	548
O 585.00			1	9	22	45	84	103	96	67	52	27	16	11	2	1		536
U 575.00	1	1	2	10	18	39	80	78	94	77	47	27	12	6		1	1	494
L 565.00			3	11	25	38	53	66	47	41	36	4	3	3	1			331
D 555.00		1	3	6	18	26	45	59	46	31	17	8	4					264
E 545.00		1		5	8	31	34	24	24	14	6	5						152
R 535.00		1		2	8	14	14	22	19	6	5	3			1			95
525.00			1	2	2	8	8	8	11	4	2							46
H 515.00				.	2	5	8	5	2	1	1							24
T 505.00				1	2	2		2										7
495.00																		0
485.00						1												1
	1	6	17	72	157	334	556	669	679	588	448	219	141	87	12	10	4	4000

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-SHOULDER H'T/SIT.	590.86	28.46	(0.336)*Y + (438.167)	27.41
Y-SHOULDER BREADTH	454.10	22.75	(0.215)*X + (327.135)	21.91

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CORRELATION COEFFICIENT 0.269 (BASED ON ORIGINAL DATA) 0.265 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.271	0.943	15+3983	-0.04
Y AS A FUNCTION OF X	0.274	1.209	18+3980	0.70

BIVARIATE FREQUENCY TABLE FOR
SEATED SHOULDER HT AND SEATED SHOULDER BREADTH

SEATED SHOULDER BREADTH

	374.00	384.00	394.00	404.00	414.00	424.00	434.00	444.00	454.00	464.00	474.00	484.00	494.00	504.00	514.00	524.00	534.00	TOTAL
685.00											0.0							0.0
S 675.00						0.0			0.0		0.0	0.0						0.1
E 665.00				0.0		0.0	0.1	0.1	0.1	0.0		0.0	0.0		0.0			0.4
A 655.00		0.0			0.0		0.1	0.1	0.1	0.2	0.3	0.0	0.0	0.1				1.0
T 645.00				0.0		0.0	0.2	0.2	0.2	0.5	0.5	0.2	0.1	0.1	0.0		0.0	2.4
E 635.00				0.1	0.0	0.2	0.3	0.6	0.6	0.9	0.6	0.4	0.3	0.1	0.0	0.0		4.3
D 625.00			0.0	0.0	0.1	0.3	0.6	0.9	1.3	0.9	0.7	0.5	0.5	0.3	0.0	0.0	0.0	6.3
615.00		0.0	0.0	0.1	0.2	0.5	0.9	1.4	1.7	1.5	1.2	0.8	0.4	0.3	0.0	0.1		9.3
S 605.00			0.1	0.1	0.4	1.1	1.3	1.9	2.2	2.4	2.2	0.7	0.6	0.4	0.0	0.0		13.6
H 595.00			0.0	0.2	0.5	0.9	2.2	2.1	2.1	2.1	1.5	0.9	0.6	0.3	0.0		0.0	13.7
O 585.00			0.0	0.2	0.5	1.1	2.1	2.6	2.4	1.7	1.3	0.7	0.4	0.3	0.0	0.0		13.4
U 575.00	0.0	0.0	0.0	0.2	0.4	1.0	2.0	1.9	2.3	1.9	1.2	0.7	0.3	0.1		0.0	0.0	12.3
L 565.00			0.1	0.3	0.6	0.9	1.3	1.6	1.2	1.0	0.9	0.1	0.1	0.1	0.0			8.3
D 555.00		0.0	0.1	0.1	0.4	0.6	1.1	1.5	1.1	0.8	0.4	0.2	0.1					6.6
E 545.00		0.0		0.1	0.2	0.8	0.8	0.6	0.6	0.3	0.1	0.1						3.8
R 535.00		0.0		0.0	0.2	0.3	0.3	0.5	0.5	0.1	0.1	0.1			0.0			2.4
525.00			0.0	0.0	0.0	0.2	0.2	0.2	0.3	0.1	0.0							1.1
H 515.00					0.0	0.1	0.2	0.1	0.0	0.0	0.0							0.6
T 505.00				0.0	0.0	0.0		0.0										0.2
495.00																		0.
485.00						0.0												0.0
	0.0	0.1	0.4	1.8	3.9	8.3	13.9	16.7	17.0	14.7	11.2	5.5	3.5	2.2	0.3	0.2	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 4000.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-SHOULDER H'T/SIT.	590.86	28.46	(0.336)*Y + (439.167)	27.41
Y-SHOULDER BREADTH	454.10	22.75	(0.215)*X + (327.135)	21.91

***

CORRELATION COEFFICIENT 0.269 (BASED ON ORIGINAL DATA) 0.265 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.271	0.943	15+3983	-0.04
Y AS A FUNCTION OF X	0.274	1.209	18+3980	0.70

BIVARIATE FREQUENCY TABLE FOR
SEATED SHOULDER HT AND SHOULDER-ELBOW LENGTH

SHOULDER-ELBOW LENGTH

SEATED SHOULDER HT	294.00	304.00	314.00	324.00	334.00	344.00	354.00	364.00	374.00	384.00	394.00	404.00	414.00	424.00	434.00	TOTAL
685.00												1				1
S 675.00							1				3	1				5
E 665.00						1	3	2	4	2	3	1	1		1	18
A 655.00					1		3	6	7	10	11	2				40
T 645.00					2	6	4	21	14	30	15	4				96
E 635.00					1	14	19	29	49	35	20	4	1			172
D 625.00					4	15	40	56	59	49	20	7	2			252
615.00					7	29	63	84	92	63	25	8	1			372
S 605.00			1	4	23	47	107	142	115	73	28	6				546
H 595.00				9	22	52	122	135	118	63	24	2	1			548
O 585.00			1	8	37	69	110	144	97	50	13	6	1			536
U 575.00		1	2	14	39	86	122	115	70	32	10	1	2			494
L 565.00			1	16	38	62	99	65	37	11	2					331
D 555.00		1	2	11	36	52	80	50	22	9	1					264
E 545.00	1	1	3	10	21	33	35	28	14	3	3					152
R 535.00		1	2	6	15	31	21	12	5	2						95
525.00			3	3	10	17	10	3								46
H 515.00		1	1	2	2	6	7	2	3							24
T 505.00				2	3		2									7
495.00																0
485.00					1											1
	1	5	16	85	262	520	848	894	706	432	178	43	9	0	1	4000

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-SHOULDER H'T/SIT.	590.86	28.46	(0.735)*Y + (323.472)	25.51
Y-SHOULDER-ELBOW L'H	363.68	17.16	(0.267)*X + (205.666)	15.38

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CORRELATION COEFFICIENT 0.443 (BASED ON ORIGINAL DATA) 0.436 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.437	0.580	12+3986	-1.08
Y AS A FUNCTION OF X	0.439	0.828	18+3980	-0.44

BIVARIATE FREQUENCY TABLE FOR
SEATED SHOULDER HT AND SHOULDER-ELBOW LENGTH

SHOULDER-ELBOW LENGTH

		294 .00	304 .00	314 .00	324 .00	334 .00	344 .00	354 .00	364 .00	374 .00	384 .00	394 .00	404 .00	414 .00	424 .00	434 .00	TOTAL
	685.00												0.0				0.0
S	675.00							0.0				0.1	0.0				0.1
E	665.00						0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.0		0.0	0.4
A	655.00					0.0		0.1	0.1	0.2	0.2	0.3	0.0				1.0
T	645.00					0.0	0.1	0.1	0.5	0.3	0.7	0.4	0.1				2.4
E	635.00					0.0	0.3	0.5	0.7	1.2	0.9	0.5	0.1	0.0			4.3
D	625.00					0.1	0.4	1.0	1.4	1.5	1.2	0.5	0.2	0.0			6.3
	615.00					0.2	0.7	1.6	2.1	2.3	1.6	0.6	0.2	0.0			9.3
S	605.00			0.0	0.1	0.6	1.2	2.7	3.5	2.9	1.8	0.7	0.1				13.6
H	595.00				0.2	0.5	1.3	3.0	3.4	2.9	1.6	0.6	0.0	0.0			13.7
O	585.00			0.0	0.2	0.9	1.7	2.7	3.6	2.4	1.2	0.3	0.1	0.0			13.4
U	575.00		0.0	0.0	0.3	1.0	2.1	3.0	2.9	1.7	0.8	0.2	0.0	0.0			12.3
L	565.00			0.0	0.4	0.9	1.5	2.5	1.6	0.9	0.3	0.0					8.3
D	555.00		0.0	0.0	0.3	0.9	1.3	2.0	1.2	0.5	0.2	0.0					6.6
E	545.00	0.0	0.0	0.1	0.2	0.5	0.8	0.9	0.7	0.3	0.1	0.1					3.8
R	535.00		0.0	0.0	0.1	0.4	0.8	0.5	0.3	0.1	0.0						2.4
	525.00			0.1	0.1	0.2	0.4	0.2	0.1								1.1
H	515.00		0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.1							0.6
T	505.00				0.0	0.1		0.0									0.2
	495.00																0.
	485.00					0.0											0.0
		0.0	0.1	0.4	2.1	6.5	13.0	21.2	22.3	17.6	10.8	4.4	1.1	0.2	0.	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 4000.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-SHOULDER H'T/SIT.	590.86	28.46	(0.735)*Y + (323.472)	25.51
Y-SHOULDER-ELBOW L'H	363.68	17.16	(0.267)*X + (205.666)	15.38

***

CORRELATION COEFFICIENT 0.443 (BASED ON ORIGINAL DATA) 0.436 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.437	0.580	12+3986	-1.08
Y AS A FUNCTION OF X	0.439	0.828	18+3980	-0.44

BIVARIANT DATA OF THE 1967 USAF PILOT SURVEY

BIVARIATE FREQUENCY TABLE FOR
SEATED HEIGHT AND FORWARD ARM REACH

FORWARD ARM REACH

	667.50	682.50	697.50	712.50	727.50	742.50	757.50	772.50	787.50	802.50	817.50	832.50	847.50	862.50	877.50	892.50	907.50	922.50	937.50	952.50	TOTAL
1045.00														1							1
1035.00							1					1									2
1025.00											1			2				1			4
1015.00								1			2	1	4			1					9
1005.00								1	2		5	1	4	3	1	4	1				22
S 995.00								3	6	6	8	10	9	6	4	4	2	2		1	61
E 985.00							2	3	4	8	12	13	10	9	4	2	3				70
A 975.00						3	1	3	7	29	18	11	11	9	9	3	2			1	107
T 965.00					2		5	14	14	20	24	37	15	15	7	1	3				157
E 955.00					6	4	10	19	38	28	36	29	32	9	7	5	2				225
D 945.00				2	2	8	16	25	40	49	49	41	24	15	3	4	4	1			283
935.00				1	5	16	18	36	58	39	40	35	25	9	10	2	1				295
H 925.00		1		4	8	18	21	39	50	47	43	24	17	10	6	2					290
E 915.00			1	2	7	10	26	48	42	53	32	35	9	3	6	1					275
I 905.00	1	1	3	6	12	18	35	39	33	32	27	15	9	5	2	2		1			241
G 895.00		1		3	2	12	25	26	25	18	8	10	3	2	2	1	1				139
H 885.00	1	1	1	2	7	12	18	19	11	19	7	7	4	2		1		1			113
T 875.00				1	4	6	8	15	15	9	11	3	2								74
865.00			2	1	3	5	2	3	7	3	1	2	1	1							31
855.00				3	2		2	3	1		1										12
845.00					3	1			1												5
835.00					1	1						1									3
825.00																					0
815.00																					0
805.00					1																1
	2	4	7	25	65	114	190	297	354	360	325	276	179	101	61	33	19	6	0	2	2420

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-SITTING HEIGHT	931.84	31.76	(0.329)*Y + (667.473)	28.93
Y-THUMB-TIP REACH	803.08	39.80	(0.517)*X + (321.215)	36.26

***

CORRELATION COEFFICIENT 0.413 (BASED ON ORIGINAL DATA) 0.412 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.415	0.466	17+2401	-1.85
Y AS A FUNCTION OF X	0.422	1.113	21+2397	0.45

BIVARIATE FREQUENCY TABLE FOR
SEATED HEIGHT AND FORWARD ARM REACH

FORWARD ARM REACH

	667 .50	682 .50	697 .50	712 .50	727 .50	742 .50	757 .50	772 .50	787 .50	802 .50	817 .50	832 .50	847 .50	862 .50	877 .50	892 .50	907 .50	922 .50	937 .50	952 .50	TOTAL
1045.00														0.0							0.0
1035.00							0.0					0.0									0.1
1025.00											0.0			0.1				0.0			0.2
1015.00								0.0			0.1	0.0	0.2			0.0					0.4
1005.00								0.0	0.1		0.2	0.0	0.2	0.1	0.0	0.2	0.0				0.9
S 995.00								0.1	0.2	0.2	0.3	0.4	0.4	0.2	0.2	0.2	0.1	0.1		0.0	2.5
E 985.00							0.1	0.1	0.2	0.3	0.5	0.5	0.4	0.4	0.2	0.1	0.1				2.9
A 975.00						0.1	0.0	0.1	0.3	1.2	0.7	0.5	0.5	0.4	0.4	0.1	0.1			0.0	4.4
T 965.00					0.1		0.2	0.6	0.6	0.8	1.0	1.5	0.6	0.6	0.3	0.0	0.1				6.5
E 955.00					0.2	0.2	0.4	0.8	1.6	1.2	1.5	1.2	1.3	0.4	0.3	0.2	0.1				9.3
D 945.00				0.1	0.1	0.3	0.7	1.0	1.7	2.0	2.0	1.7	1.0	0.6	0.1	0.2	0.2	0.0			11.7
935.00				0.0	0.2	0.7	0.7	1.5	2.4	1.6	1.7	1.4	1.0	0.4	0.4	0.1	0.0				12.2
H 925.00		0.0		0.2	0.3	0.7	0.9	1.6	2.1	1.9	1.8	1.0	0.7	0.4	0.2	0.1					12.0
E 915.00			0.0	0.1	0.3	0.4	1.1	2.0	1.7	2.2	1.3	1.4	0.4	0.1	0.2	0.0					11.4
I 905.00	0.0	0.0	0.1	0.2	0.5	0.7	1.4	1.6	1.4	1.3	1.1	0.6	0.4	0.2	0.1	0.1		0.0			10.0
G 895.00		0.0		0.1	0.1	0.5	1.0	1.1	1.0	0.7	0.3	0.4	0.1	0.1	0.1	0.0	0.0				5.7
H 885.00	0.0	0.0	0.0	0.1	0.3	0.5	0.7	0.8	0.5	0.8	0.3	0.3	0.2	0.1		0.0		0.0			4.7
T 875.00				0.0	0.2	0.2	0.3	0.6	0.6	0.4	0.5	0.1	0.1								3.1
865.00			0.1	0.0	0.1	0.2	0.1	0.1	0.3	0.1	0.0	0.1	0.0	0.0							1.3
855.00				0.1	0.1		0.1	0.1	0.0		0.0										0.5
845.00					0.1	0.0			0.0												0.2
835.00					0.0	0.0						0.0									0.1
825.00																					0.
815.00																					0.
805.00					0.0																0.0
	0.1	0.2	0.3	1.0	2.7	4.7	7.9	12.3	14.6	14.9	13.4	11.4	7.4	4.2	2.5	1.4	0.8	0.2	0.	0.1	100.0

805.00 — 814.99

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 2420.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-SITTING HEIGHT	931.84	31.76	(0.3291)*Y + (667.473)	28.93
Y-THUMB-TIP REACH	803.08	39.80	(0.5171)*X + (321.215)	36.26

***

CORRELATION COEFFICIENT 0.413 (BASED ON ORIGINAL DATA) 0.412 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.415	0.466	17+2401	-1.85
Y AS A FUNCTION OF X	0.422	1.113	21+2397	0.45

BIVARIATE FREQUENCY TABLE FOR
STATURE AND FORWARD ARM REACH

FORWARD ARM REACH

	667 .50	682 .50	697 .50	712 .50	727 .50	742 .50	757 .50	772 .50	787 .50	802 .50	817 .50	832 .50	847 .50	862 .50	877 .50	892 .50	907 .50	922 .50	937 .50	952 .50	TOTAL
1970.00																1	1				2
1950.00														2	1	1					4
1930.00											1	2	1	3		4	5	1		2	19
1910.00								1			1	3	6	6	2	4	3	1			27
S1890.00									4		2	8	11	13	5	4	4	1			52
T1870.00							2	3	1	10	18	17	27	18	16	7	2				121
A1850.00							2	2	9	14	18	29	23	10	11	5	2				125
T1830.00						2	3	5	20	17	40	33	20	19	9	1	1	1			171
U1810.00						1	4	14	37	42	51	53	35	14	9	1					261
R1790.00					3	7	14	24	41	71	64	51	18	8	5	2					308
E1770.00			1		5	9	17	40	57	72	45	40	21	4	2	1	1	1			316
1750.00					6	8	23	50	53	52	40	21	8			1					262
1730.00		1		4	9	20	37	61	52	38	26	10	8	3	1						270
1710.00				4	8	21	41	44	53	27	9	5				1		1			214
1690.00				4	8	21	20	29	8	9	9	2	1	1							112
1670.00		3	3	6	9	11	10	16	13	6	1	1									79
1650.00				4	8	5	12	5	3	2		1									40
1630.00	2		1	1	5	7	4	1	2												23
1610.00			2		1	2	1	2	1												9
1590.00				2	2																4
1570.00					1																1
	2	4	7	25	65	114	190	297	354	360	325	276	179	101	61	33	19	6	0	2	2420

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1773.43	61.88	(1.049)*Y + (930.958)	45.67
Y-THUMB-TIP REACH	803.08	39.80	(0.434)*X + (33.336)	29.37

***

CORRELATION COEFFICIENT 0.675 (BASED ON ORIGINAL DATA) 0.670 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.674	1.182	17+2401	0.61
Y AS A FUNCTION OF X	0.673	0.685	19+2399	-0.99

BIVARIATE FREQUENCY TABLE FOR
STATURE AND FORWARD ARM REACH

FORWARD ARM REACH

	667 .50	682 .50	697 .50	712 .50	727 .50	742 .50	757 .50	772 .50	787 .50	802 .50	817 .50	832 .50	847 .50	862 .50	877 .50	892 .50	907 .50	922 .50	937 .50	952 .50	TOTAL
1970.00																0.0	0.0				0.1
1950.00														0.1	0.0	0.0					0.2
1930.00											0.0	0.1	0.0	0.1		0.2	0.2	0.0		0.1	0.8
1910.00								0.0			0.0	0.1	0.2	0.2	0.1	0.2	0.1	0.0			1.1
S1890.00									0.2		0.1	0.3	0.5	0.5	0.2	0.2	0.2	0.0			2.1
T1870.00							0.1	0.1	0.0	0.4	0.7	0.7	1.1	0.7	0.7	0.3	0.1				5.0
A1850.00							0.1	0.1	0.4	0.6	0.7	1.2	1.0	0.4	0.5	0.2	0.1				5.2
T1830.00						0.1	0.1	0.2	0.8	0.7	1.7	1.4	0.8	0.8	0.4	0.0	0.0	0.0			7.1
U1810.00						0.0	0.2	0.6	1.5	1.7	2.1	2.2	1.4	0.6	0.4	0.0					10.8
R1790.00					0.1	0.3	0.6	1.0	1.7	2.9	2.6	2.1	0.7	0.3	0.2	0.1					12.7
E1770.00			0.0		0.2	0.4	0.7	1.7	2.4	3.0	1.9	1.7	0.9	0.2	0.1	0.0	0.0	0.0			13.1
1750.00					0.2	0.3	1.0	2.1	2.2	2.1	1.7	0.9	0.3			0.0					10.8
1730.00		0.0		0.2	0.4	0.8	1.5	2.5	2.1	1.6	1.1	0.4	0.3	0.1	0.0						11.2
1710.00				0.2	0.3	0.9	1.7	1.8	2.2	1.1	0.4	0.2				0.0		0.0			8.8
1690.00				0.2	0.3	0.9	0.8	1.2	0.3	0.4	0.4	0.1	0.0	0.0							4.6
1670.00		0.1	0.1	0.2	0.4	0.5	0.4	0.7	0.5	0.2	0.0	0.0									3.3
1650.00				0.2	0.3	0.2	0.5	0.2	0.1	0.1		0.0									1.7
1630.00	0.1		0.0	0.0	0.2	0.3	0.2	0.0	0.1												1.0
1610.00			0.1		0.0	0.1	0.0	0.1	0.0												0.4
1590.00				0.1	0.1																0.2
1570.00					0.0																0.0
	0.1	0.2	0.3	1.0	2.7	4.7	7.9	12.3	14.6	14.9	13.4	11.4	7.4	4.2	2.5	1.4	0.8	0.2	0.	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 2420.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1773.43	61.88	(1.049)*Y + (930.958)	45.67
Y-THUMB-TIP REACH	803.08	39.80	(0.434)*X + (33.336)	29.37

***

CORRELATION COEFFICIENT 0.675 (BASED ON ORIGINAL DATA) 0.670 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.674	1.182	17+2401	0.61
Y AS A FUNCTION OF X	0.673	0.685	19+2399	-0.99

BIVARIATE FREQUENCY TABLE FOR
SEATED SHOULDER HEIGHT AND FORWARD ARM REACH

FORWARD ARM REACH

	667.50	682.50	697.50	712.50	727.50	742.50	757.50	772.50	787.50	802.50	817.50	832.50	847.50	862.50	877.50	892.50	907.50	922.50	937.50	952.50	TOTAL
S 715.00							1				1										2
E 705.00																					0
A 695.00								1	1		1	1	2	1		1					8
T 685.00							1			1	1	1		1	1			1			7
E 675.00									1	6	3	5	3	5	1	2	1				27
D 665.00						1	1	4	7	8	10	14	14	4	2	8	1				74
655.00					2	1	3	5	8	10	10	15	16	3	9		2				84
S 645.00					2	5	4	10	20	20	19	17	19	14	3	5	1	1		2	142
H 635.00					1	1	10	20	35	30	36	36	21	18	8	2	5				223
O 625.00				4	5	3	15	32	42	46	42	42	27	14	10	2	2	2			288
U 615.00		1	1	1	6	18	25	44	51	57	51	43	23	12	6	3	4				346
L 605.00			1	1	9	21	24	53	41	44	55	29	22	11	4	2	2				319
D 595.00		1		4	7	18	31	37	49	49	40	38	13	8	8	3					306
E 585.00		2		4	11	17	31	37	42	43	27	14	11	3	6	3	1	1			253
R 575.00	1		1	5	7	10	19	29	28	21	16	10	4	5	2						158
565.00	1		1	1	5	8	17	14	18	16	9	7	1		1	1					100
H 555.00			1	2	3	5	4	8	8	5	2	3	1			1					43
E 545.00			1	1	5	3	3	2	2	4	2		2	2				1			28
I 535.00			1	1		1	1		1			1									6
G 525.00					2	1		1													4
H 515.00				1																	1
T 505.00																					0
495.00						1															1
	2	4	7	25	65	114	190	297	354	360	325	276	179	101	61	33	19	6	0	2	2420

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-ACROMION H'GHT/SIT	610.53	28.54	(0.249)*Y + (410.832)	26.77
Y-THUMB-TIP REACH	803.08	39.80	(0.484)*X + (507.771)	37.33

***

CORRELATION COEFFICIENT 0.347 (BASED ON ORIGINAL DATA) 0.344 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.352	0.959	17+2401	-0.01
Y AS A FUNCTION OF X	0.352	0.871	19+2399	-0.31

BIVARIATE FREQUENCY TABLE FOR
SEATED SHOULDER HEIGHT AND FORWARD ARM REACH

FORWARD ARM REACH

		667 .50	682 .50	697 .50	712 .50	727 .50	742 .50	757 .50	772 .50	787 .50	802 .50	817 .50	832 .50	847 .50	862 .50	877 .50	892 .50	907 .50	922 .50	937 .50	952 .50	TOTAL
S	715.00							0.0				0.0										0.1
E	705.00																					0.
A	695.00								0.0	0.0		0.0	0.0	0.1	0.0		0.0					0.3
T	685.00							0.0			0.0	0.0	0.0		0.0	0.0			0.0			0.3
E	675.00									0.0	0.2	0.1	0.2	0.1	0.2	0.0	0.1	0.0				1.1
D	665.00						0.0	0.0	0.2	0.3	0.3	0.4	0.6	0.6	0.2	0.1	0.3	0.0				3.1
	655.00					0.1	0.0	0.1	0.2	0.3	0.4	0.4	0.6	0.7	0.1	0.4		0.1				3.5
S	645.00					0.1	0.2	0.2	0.4	0.8	0.8	0.8	0.7	0.8	0.6	0.1	0.2	0.0	0.0		0.1	5.9
H	635.00					0.0	0.0	0.4	0.8	1.4	1.2	1.5	1.5	0.9	0.7	0.3	0.1	0.2				9.2
O	625.00				0.2	0.2	0.1	0.6	1.3	1.7	1.9	1.7	1.7	1.1	0.6	0.4	0.1	0.1	0.1			11.9
U	615.00		0.0	0.0	0.0	0.2	0.7	1.0	1.8	2.1	2.4	2.1	1.8	1.0	0.5	0.2	0.1	0.2				14.3
L	605.00			0.0	0.0	0.4	0.9	1.0	2.2	1.7	1.8	2.3	1.2	0.9	0.5	0.2	0.1	0.1				13.2
D	595.00		0.0		0.2	0.3	0.7	1.3	1.5	2.0	2.0	1.7	1.6	0.5	0.3	0.3	0.1					12.6
E	585.00		0.1		0.2	0.5	0.7	1.3	1.5	1.7	1.8	1.1	0.6	0.5	0.1	0.2	0.1	0.0	0.0			10.5
R	575.00	0.0		0.0	0.2	0.3	0.4	0.8	1.2	1.2	0.9	0.7	0.4	0.2	0.2	0.1						6.5
	565.00	0.0		0.0	0.0	0.2	0.3	0.7	0.6	0.7	0.7	0.4	0.3	0.0		0.0	0.0					4.1
H	555.00			0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.2	0.1	0.1	0.0			0.0					1.8
E	545.00			0.0	0.0	0.2	0.1	0.1	0.1	0.1	0.2	0.1		0.1	0.1				0.0			1.2
I	535.00			0.0	0.0		0.0	0.0		0.0			0.0									0.2
G	525.00					0.1	0.0		0.0													0.2
H	515.00				0.0																	0.0
T	505.00																					0.
	495.00						0.0															0.0
		0.1	0.2	0.3	1.0	2.7	4.7	7.9	12.3	14.6	14.9	13.4	11.4	7.4	4.2	2.5	1.4	0.8	0.2	0.	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 2420.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-ACROMION H'GHT/SIT	610.53	28.54	(0.249)*Y + (410.832)	26.77
Y-THUMB-TIP REACH	803.08	39.80	(0.484)*X + (507.771)	37.33

***

CORRELATION COEFFICIENT 0.347 (BASED ON ORIGINAL DATA) 0.344 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.352	0.959	17+2401	-0.01
Y AS A FUNCTION OF X	0.352	0.871	19+2399	-0.31

BIVARIATE FREQUENCY TABLE FOR
BUTTOCK-KNEE LNGTH AND FORWARD ARM REACH

FORWARD ARM REACH

		667 .50	682 .50	697 .50	712 .50	727 .50	742 .50	757 .50	772 .50	787 .50	802 .50	817 .50	832 .50	847 .50	862 .50	877 .50	892 .50	907 .50	922 .50	937 .50	952 .50	TOTAL
B	695.00													1			1					2
U	685.00												2	1		2		3				8
T	675.00											2	3	4	3	1	1	2	1		2	19
T	665.00												3	8	4	4	5	2				26
O	655.00							1	1	2	4	5	10	13	13	4	3	2				58
C	645.00		1						5	5	13	14	18	14	17	7	3	3	1			101
K	635.00							5	4	14	25	25	32	23	21	11	3	4	1			168
-	625.00						1	4	11	19	32	51	46	41	21	14	6	2	2			250
K	615.00				1	3	8	16	33	50	60	61	56	26	12	7	8	1				342
N	605.00					5	11	13	43	64	67	62	49	22	3	7						346
E	595.00		1	1	2	6	19	30	65	69	56	52	35	11	2	3	1					353
E	585.00			1	4	12	24	37	35	55	46	30	10	10	2	1	1		1			269
	575.00		1		4	15	23	37	57	38	36	12	8	4	2		1					238
L	565.00		1	1	5	9	14	25	19	25	13	8	4		1							125
N	555.00			2	4	6	8	14	16	8	5	2		1								66
G	545.00	1		2	3	4	2	4	3	4	3	1										27
T	535.00				2	2	2	1	5	1												13
H	525.00	1				3	1	3														8
	515.00						1															1
		2	4	7	25	65	114	190	297	354	360	325	276	179	101	61	33	19	6	0	2	2420

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BUTTOCK-KNEE LNGTH	604.03	27.02	(0.411)*Y + (274.119)	21.52
Y-THUMB-TIP REACH	803.08	39.80	(0.891)*X + (264.784)	31.69

***

CORRELATION COEFFICIENT 0.605 (BASED ON ORIGINAL DATA) 0.599 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.607	2.186	17+2401	2.70
Y AS A FUNCTION OF X	0.604	1.426	17+2401	1.21

BIVARIATE FREQUENCY TABLE FOR
BUTTOCK-KNEE LNGTH AND FORWARD ARM REACH

FORWARD ARM REACH

	667 .50	682 .50	697 .50	712 .50	727 .50	742 .50	757 .50	772 .50	787 .50	802 .50	817 .50	832 .50	847 .50	862 .50	877 .50	892 .50	907 .50	922 .50	937 .50	952 .50	TOTAL
B 695.00													0.0			0.0					0.1
U 685.00												0.1	0.0		0.1		0.1				0.3
T 675.00											0.1	0.1	0.2	0.1	0.0	0.0	0.1	0.0		0.1	0.8
T 665.00												0.1	0.3	0.2	0.2	0.2	0.1				1.1
O 655.00							0.0	0.0	0.1	0.2	0.2	0.4	0.5	0.5	0.2	0.1	0.1				2.4
C 645.00		0.0						0.2	0.2	0.5	0.6	0.7	0.6	0.7	0.3	0.1	0.1	0.0			4.2
K 635.00							0.2	0.2	0.6	1.0	1.0	1.3	1.0	0.9	0.5	0.1	0.2	0.0			6.9
- 625.00						0.0	0.2	0.5	0.8	1.3	2.1	1.9	1.7	0.9	0.6	0.2	0.1	0.1			10.3
K 615.00				0.0	0.1	0.3	0.7	1.4	2.1	2.5	2.5	2.3	1.1	0.5	0.3	0.3	0.0				14.1
N 605.00					0.2	0.5	0.5	1.8	2.6	2.8	2.6	2.0	0.9	0.1	0.3						14.3
E 595.00		0.0	0.0	0.1	0.2	0.8	1.2	2.7	2.9	2.3	2.1	1.4	0.5	0.1	0.1	0.0					14.6
E 585.00			0.0	0.2	0.5	1.0	1.5	1.4	2.3	1.9	1.2	0.4	0.4	0.1	0.0	0.0		0.0			11.1
575.00		0.0		0.2	0.6	1.0	1.5	2.4	1.6	1.5	0.5	0.3	0.2	0.1		0.0					9.8
L 565.00		0.0	0.0	0.2	0.4	0.6	1.0	0.8	1.0	0.5	0.3	0.2		0.0							5.2
N 555.00			0.1	0.2	0.2	0.3	0.6	0.7	0.3	0.2	0.1		0.0								2.7
G 545.00	0.0		0.1	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.0										1.1
T 535.00				0.1	0.1	0.1	0.0	0.2	0.0												0.5
H 525.00	0.0				0.1	0.0	0.1														0.3
515.00						0.0															0.0
	0.1	0.2	0.3	1.0	2.7	4.7	7.9	12.3	14.6	14.9	13.4	11.4	7.4	4.2	2.5	1.4	0.8	0.2	0.	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 2420.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BUTTOCK-KNEE LNGTH	604.03	27.02	(0.411)*Y + (274.119)	21.52
Y-THUMB-TIP REACH	803.08	39.80	(0.891)*X + (264.784)	31.69

***

CORRELATION COEFFICIENT 0.605 (BASED ON ORIGINAL DATA) 0.599 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.607	2.186	17+2401	2.70
Y AS A FUNCTION OF X	0.604	1.426	17+2401	1.21

BIVARIATE FREQUENCY TABLE FOR
SEATED EYE HEIGHT AND FORWARD ARM REACH

FORWARD ARM REACH

		667.50	682.50	697.50	712.50	727.50	742.50	757.50	772.50	787.50	802.50	817.50	832.50	847.50	862.50	877.50	892.50	907.50	922.50	937.50	952.50	TOTAL
	905.00							1				1	1									3
	895.00											4		2	1				1			8
S	885.00								1	1	1	4	2	3	4		3					19
E	875.00								2	5	3	5	6	5	3	2	2	1	1		1	36
A	865.00						2	1	3	6	8	7	11	8	7	3	5	2	1			64
T	855.00					1		1	3	8	13	16	19	10	14	6	2	2				95
E	845.00						3	3	8	13	26	15	18	17	12	12	1	5			1	134
D	835.00					3	2	13	20	24	37	37	30	21	11	6	6	2				212
	825.00				2	4	13	13	23	40	37	44	39	27	13	5	5	2				267
E	815.00		1		2	6	10	19	35	62	38	52	47	27	10	8	1	2	1			321
Y	805.00			1	3	5	9	18	47	52	45	43	27	22	11	10			1			294
E	795.00			1	2	9	23	33	47	41	56	37	29	14	6	4	3	2				307
	785.00	1	1	1	3	9	19	29	40	45	48	21	22	12	5	3	3					262
H	775.00		2	1	3	10	10	26	33	26	21	21	16	4	3	2	2	1				181
E	765.00	1		1	5	3	7	21	19	17	14	5	4	4	1				1			103
I	755.00			2	2	5	7	8	10	10	10	4	2	1								61
G	745.00				2	3	6	2	4	2	2	9	1	2								33
H	735.00				1	5	1	1	2	1	1		1									13
T	725.00					1	1	1		1												4
	715.00						1						1									2
	705.00																					0
	695.00																					0
	685.00					1																1
		2	4	7	25	65	114	190	297	354	360	325	276	179	101	61	33	19	6	0	2	2420

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-EYE HEIGHT/SITTING	809.50	30.16	(0.296)*Y + (571.626)	27.76
Y-THUMB-TIP REACH	803.08	39.80	(0.516)*X + (385.584)	36.63

***

CORRELATION COEFFICIENT 0.391 (BASED ON ORIGINAL DATA) 0.391 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.395	0.570	17+2401	-1.38
Y AS A FUNCTION OF X	0.399	0.899	19+2399	-0.22

BIVARIATE FREQUENCY TABLE FOR
SEATED EYE HEIGHT AND FORWARD ARM REACH

FORWARD ARM REACH

	667 .50	682 .50	697 .50	712 .50	727 .50	742 .50	757 .50	772 .50	787 .50	802 .50	817 .50	832 .50	847 .50	862 .50	877 .50	892 .50	907 .50	922 .50	937 .50	952 .50	TOTAL
905.00							0.0				0.0	0.0									0.1
895.00											0.2		0.1	0.0				0.0			0.3
S 885.00								0.0	0.0	0.0	0.2	0.1	0.1	0.2		0.1					0.8
E 875.00								0.1	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.0		0.0	1.5
A 865.00						0.1	0.0	0.1	0.2	0.3	0.3	0.5	0.3	0.3	0.1	0.2	0.1	0.0			2.6
T 855.00					0.0		0.0	0.1	0.3	0.5	0.7	0.8	0.4	0.6	0.2	0.1	0.1				3.9
E 845.00						0.1	0.1	0.3	0.5	1.1	0.6	0.7	0.7	0.5	0.5	0.0	0.2			0.0	5.5
D 835.00					0.1	0.1	0.5	0.8	1.0	1.5	1.5	1.2	0.9	0.5	0.2	0.2	0.1				8.8
825.00				0.1	0.2	0.5	0.5	1.0	1.7	1.5	1.8	1.6	1.1	0.5	0.2	0.2	0.1				11.0
E 815.00		0.0		0.1	0.2	0.4	0.8	1.4	2.6	1.6	2.1	1.9	1.1	0.4	0.3	0.0	0.1	0.0			13.3
Y 805.00			0.0	0.1	0.2	0.4	0.7	1.9	2.1	1.9	1.8	1.1	0.9	0.5	0.4			0.0			12.1
E 795.00			0.0	0.1	0.4	1.0	1.4	1.9	1.7	2.3	1.5	1.2	0.6	0.2	0.2	0.1	0.1				12.7
785.00	0.0	0.0	0.0	0.1	0.4	0.8	1.2	1.7	1.9	2.0	0.9	0.9	0.5	0.2	0.1	0.1					10.8
H 775.00		0.1	0.0	0.1	0.4	0.4	1.1	1.4	1.1	0.9	0.9	0.7	0.2	0.1	0.1	0.1	0.0				7.5
E 765.00	0.0		0.0	0.2	0.1	0.3	0.9	0.8	0.7	0.6	0.2	0.2	0.2	0.0				0.0			4.3
I 755.00			0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.4	0.2	0.1	0.0								2.5
G 745.00				0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.4	0.0	0.1								1.4
H 735.00				0.0	0.2	0.0	0.0	0.1	0.0	0.0		0.0									0.5
T 725.00					0.0	0.0	0.0		0.0												0.2
715.00						0.0						0.0									0.1
705.00																					0.
695.00																					0.
685.00					0.0																0.0
	0.1	0.2	0.3	1.0	2.7	4.7	7.9	12.3	14.6	14.9	13.4	11.4	7.4	4.2	2.5	1.4	0.8	0.2	0.	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 2420.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-EYE HEIGHT/SITTING	809.50	30.16	(0.296)*Y + (571.626)	27.76
Y-THUMB-TIP REACH	803.08	39.80	(0.516)*X + (385.584)	36.63

***

CORRELATION COEFFICIENT 0.391 (BASED ON ORIGINAL DATA) 0.391 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.395	0.570	17+2401	-1.38
Y AS A FUNCTION OF X	0.399	0.899	19+2399	-0.22

BIVARIATE FREQUENCY TABLE FOR
SEATD SHLDR BRDTH AND FORWARD ARM REACH

FORWARD ARM REACH

	667 .50	682 .50	697 .50	712 .50	727 .50	742 .50	757 .50	772 .50	787 .50	802 .50	817 .50	832 .50	847 .50	862 .50	877 .50	892 .50	907 .50	922 .50	937 .50	952 .50	TOTAL
S 565.00		1						1			1		1								4
E 555.00										2	1	1	2				1				7
A 545.00								1	3	3	2	3	3		1	1	1	1		1	20
T 535.00				1	1	1	3	4	5	8	9	8	15	1	1		1			1	59
D 525.00					1	3	5	8	11	13	11	19	13	7	3	2	1	1			98
515.00					2	3	7	17	17	19	16	20	17	14	7	3	3				145
S 505.00				1	4	5	13	14	26	44	28	23	15	17	11	7	5	1			214
H 495.00			2	2	5	14	16	37	48	49	58	44	23	21	14	6	3	1			343
L 485.00		1	1	4	13	15	28	46	51	53	54	47	27	12	8	4	3	1			368
D 475.00		1		4	14	18	33	43	60	46	57	42	25	19	6	4	1	1			374
R 465.00			1	5	4	19	31	44	57	50	41	32	17	6	6	2					315
455.00		1	1	4	8	16	18	44	37	34	26	26	12	3	2	2					234
B 445.00	1			3	6	10	17	22	17	21	10	6	7	1	2	2					125
R 435.00			2	1	4	5	12	8	12	10	5	3	2								64
D 425.00	1				2	4	4	5	6	8	5	1									36
T 415.00					1	1	2	2	2			1									9
H 405.00							1	1	1		1										4
395.00									1												1
	2	4	7	25	65	114	190	297	354	360	325	276	179	101	61	33	19	6	0	2	2420

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BIDELTOID BREADTH	482.42	25.64	(0.180)*Y + (337.896)	24.62
Y-THUMB-TIP REACH	803.08	39.80	(0.434)*X + (593.874)	38.22

***

CORRELATION COEFFICIENT 0.279 (BASED ON ORIGINAL DATA) 0.270 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.286	1.401	17+2401	1.15
Y AS A FUNCTION OF X	0.283	1.160	16+2402	0.54

BIVARIATE FREQUENCY TABLE FOR
SEATD SHLDR BRDTH AND FORWARD ARM REACH

FORWARD ARM REACH

		667 .50	682 .50	697 .50	712 .50	727 .50	742 .50	757 .50	772 .50	787 .50	802 .50	817 .50	832 .50	847 .50	862 .50	877 .50	892 .50	907 .50	922 .50	937 .50	952 .50	TOTAL
S	565.00		0.0						0.0			0.0		0.0								0.2
E	555.00										0.1	0.0	0.0	0.1				0.0				0.3
A	545.00								0.0	0.1	0.1	0.1	0.1	0.1		0.0	0.0	0.0	0.0		0.0	0.8
T	535.00				0.0	0.0	0.0	0.1	0.2	0.2	0.3	0.4	0.3	0.6	0.0	0.0		0.0			0.0	2.4
D	525.00					0.0	0.1	0.2	0.3	0.5	0.5	0.5	0.8	0.5	0.3	0.1	0.1	0.0	0.0			4.0
	515.00					0.1	0.1	0.3	0.7	0.7	0.8	0.7	0.8	0.7	0.6	0.3	0.1	0.1				6.0
S	505.00				0.0	0.2	0.2	0.5	0.6	1.1	1.8	1.2	1.0	0.6	0.7	0.5	0.3	0.2	0.0			8.8
H	495.00			0.1	0.1	0.2	0.6	0.7	1.5	2.0	2.0	2.4	1.8	1.0	0.9	0.6	0.2	0.1	0.0			14.2
L	485.00		0.0	0.0	0.2	0.5	0.6	1.2	1.9	2.1	2.2	2.2	1.9	1.1	0.5	0.3	0.2	0.1	0.0			15.2
D	475.00		0.0		0.2	0.6	0.7	1.4	1.8	2.5	1.9	2.4	1.7	1.0	0.8	0.2	0.2	0.0	0.0			15.5
R	465.00			0.0	0.2	0.2	0.8	1.3	1.8	2.4	2.1	1.7	1.3	0.7	0.2	0.2	0.1					13.0
	455.00		0.0	0.0	0.2	0.3	0.7	0.7	1.8	1.5	1.4	1.1	1.1	0.5	0.1	0.1	0.1					9.7
B	445.00	0.0			0.1	0.2	0.4	0.7	0.9	0.7	0.9	0.4	0.2	0.3	0.0	0.1	0.1					5.2
R	435.00			0.1	0.0	0.2	0.2	0.5	0.3	0.5	0.4	0.2	0.1	0.1								2.6
D	425.00	0.0				0.1	0.2	0.2	0.2	0.2	0.3	0.2	0.0									1.5
T	415.00					0.0	0.0	0.1	0.1	0.1			0.0									0.4
H	405.00							0.0	0.0	0.0		0.0										0.2
	395.00									0.0												0.0
		0.1	0.2	0.3	1.0	2.7	4.7	7.9	12.3	14.6	14.9	13.4	11.4	7.4	4.2	2.5	1.4	0.8	0.2	0.	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 2420.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BIDELTOID BREADTH	482.42	25.64	(0.180)*Y + (337.896)	24.62
Y-THUMB-TIP REACH	803.08	39.80	(0.434)*X + (593.874)	38.22

***

CORRELATION COEFFICIENT 0.279 (BASED ON ORIGINAL DATA) 0.270 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.286	1.401	17+2401	1.15
Y AS A FUNCTION OF X	0.283	1.160	16+2402	0.54

BIVARIATE FREQUENCY TABLE FOR
SEATED SHOULDER HEIGHT AND BUTTOCK-KNEE LENGTH

BUTTOCK-KNEE LENGTH

		514 .00	524 .00	534 .00	544 .00	554 .00	564 .00	574 .00	584 .00	594 .00	604 .00	614 .00	624 .00	634 .00	644 .00	654 .00	664 .00	674 .00	684 .00	694 .00	TOTAL
S	715.00								1						1						2
E	705.00																				0
A	695.00						1	1			1	2	1		1		1				8
T	685.00								1		1		2	2	1						7
E	675.00								1	3	4	3	8	2	2	1	2		1		27
D	665.00							2	4	5	11	17	11	4	7	6	5	2			74
	655.00					1	1	4	4	9	11	15	14	9	2	10	4				84
S	645.00		1		1	1	2	13	9	16	16	21	25	13	7	8	4	4	1		142
H	635.00						12	13	15	29	44	33	28	20	15	5	3	4	2		223
O	625.00				2	6	17	15	28	40	44	38	37	34	16	5	2	3	1		288
U	615.00				2	6	12	33	43	49	53	55	32	25	22	7	3	2	1	1	346
L	605.00	1	1			16	8	40	31	53	43	50	32	27	8	7	1		1		319
D	595.00		1	2	3	7	18	31	49	52	44	45	25	15	6	5		1	1	1	306
E	585.00		2	4	3	10	27	31	35	45	29	28	21	8	7		1	2			253
R	575.00		3	2	2	6	9	21	30	31	25	11	5	7	2	3		1			158
	565.00			2	6	5	12	17	12	10	14	13	4	2	3						100
H	555.00			1	4	5	4	8	4	7	2	6	1			1					43
E	545.00				2	2	1	5	2	4	4	3	4		1						28
I	535.00			1		1	1	1				2									6
G	525.00			1	1			2													4
H	515.00				1																1
T	505.00																				0
	495.00							1													1
		1	8	13	27	66	125	238	269	353	346	342	250	168	101	58	26	19	8	2	2420

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-ACROMION H'GHT/SIT	610.53	28.54	(0.358)*Y + (394.552)	26.85
Y-BUTTOCK-KNEE LNGTH	604.03	27.02	(0.321)*X + (408.289)	25.43

***

CORRELATION COEFFICIENT 0.339 (BASED ON ORIGINAL DATA) 0.341 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.357	1.883	17+2401	2.16
Y AS A FUNCTION OF X	0.350	0.892	19+2399	-0.24

BIVARIATE FREQUENCY TABLE FOR
SEATED SHOULDER HEIGHT AND BUTTOCK-KNEE LENGTH

BUTTOCK-KNEE LENGTH

		514 .00	524 .00	534 .00	544 .00	554 .00	564 .00	574 .00	584 .00	594 .00	604 .00	614 .00	624 .00	634 .00	644 .00	654 .00	664 .00	674 .00	684 .00	694 .00	TOTAL
S	715.00								0.0						0.0						0.1
E	705.00																				0.
A	695.00						0.0	0.0			0.0	0.1	0.0		0.0		0.0				0.3
T	685.00								0.0		0.0		0.1	0.1	0.0						0.3
E	675.00								0.0	0.1	0.2	0.1	0.3	0.1	0.1	C.0	0.1		0.0		1.1
D	665.00							0.1	0.2	0.2	0.5	0.7	0.5	0.2	0.3	0.2	0.2	0.1			3.1
	655.00					0.0	0.0	0.2	0.2	0.4	0.5	0.6	0.6	0.4	0.1	0.4	0.2				3.5
S	645.00		0.0		0.0	0.0	0.1	0.5	0.4	0.7	0.7	0.9	1.0	0.5	0.3	0.3	0.2	0.2	0.0		5.9
H	635.00						0.5	0.5	0.6	1.2	1.8	1.4	1.2	0.8	0.6	0.2	0.1	0.2	0.1		9.2
O	625.00				0.1	0.2	0.7	0.6	1.2	1.7	1.8	1.6	1.5	1.4	0.7	0.2	0.1	0.1	0.0		11.9
U	615.00				0.1	0.2	0.5	1.4	1.8	2.0	2.2	2.3	1.3	1.0	0.9	0.3	0.1	0.1	0.0	0.0	14.3
L	605.00	0.0	0.0			0.7	0.3	1.7	1.3	2.2	1.8	2.1	1.3	1.1	0.3	0.3	0.0		0.0		13.2
D	595.00		0.0	0.1	0.1	0.3	0.7	1.3	2.0	2.1	1.8	1.9	1.0	0.6	0.2	0.2		0.0	0.0	0.0	12.6
E	585.00		0.1	0.2	0.1	0.4	1.1	1.3	1.4	1.9	1.2	1.2	0.9	0.3	0.3		0.0	0.1			10.5
R	575.00		0.1	0.1	0.1	0.2	0.4	0.9	1.2	1.3	1.0	0.5	0.2	0.3	0.1	0.1		0.0			6.5
	565.00			0.1	0.2	0.2	0.5	0.7	0.5	0.4	0.6	0.5	0.2	0.1	0.1						4.1
H	555.00			0.0	0.2	0.2	0.2	0.3	0.2	0.3	0.1	0.2	0.0			0.0					1.8
E	545.00				0.1	0.1	0.0	0.2	0.1	0.2	0.2	0.1	0.2		0.0						1.2
I	535.00			0.0		0.0	0.0	0.0				0.1									0.2
G	525.00			0.0	0.0			0.1													0.2
H	515.00				0.0																0.0
T	505.00																				0.
	495.00							0.0													0.0
		0.0	0.3	0.5	1.1	2.7	5.2	9.8	11.1	14.6	14.3	14.1	10.3	6.9	4.2	2.4	1.1	0.8	0.3	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 2420.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-ACROMION H'GHT/SIT	610.53	28.54	(0.358)*Y + (394.552)	26.85
Y-BUTTOCK-KNEE LNGTH	604.03	27.02	(0.321)*X + (408.289)	25.43

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CORRELATION COEFFICIENT 0.339 (BASED ON ORIGINAL DATA) 0.341 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.357	1.883	17+2401	2.16
Y AS A FUNCTION OF X	0.350	0.892	19+2399	-0.24

BIVARIATE FREQUENCY TABLE FOR
SEATED EYE HEIGHT AND BUTTOCK-KNEE LENGTH

BUTTOCK-KNEE LENGTH

		514 .00	524 .00	534 .00	544 .00	554 .00	564 .00	574 .00	584 .00	594 .00	604 .00	614 .00	624 .00	634 .00	644 .00	654 .00	664 .00	674 .00	684 .00	694 .00	TOTAL
	905.00								1				1		1						3
	895.00										1	2	2	1	2						8
S	885.00								2		2	3	2	3	1	2	3	1			19
E	875.00								1	2	6	4	5	8	4	4		2			36
A	865.00							4	4	4	10	8	11	9	3	7	1	2	1		64
T	855.00						5	3	5	9	7	13	17	12	14	3	5	2			95
E	845.00					1	3	5	11	17	16	29	20	7	10	7	5	2	1		134
D	835.00		1			1	6	10	14	28	35	42	27	20	13	7	4	2	1	1	212
	825.00				1	6	7	27	25	34	45	38	42	22	11	5	2	1	1		267
E	815.00			1	3	6	15	21	33	42	55	48	49	26	10	4	3	3	2		321
Y	805.00			1	2	8	18	18	34	54	48	41	23	22	10	10	2	2	1		294
E	795.00		1	1	1	12	17	45	46	52	42	37	19	21	7	3	1	2			307
	785.00	1	2	2	4	8	17	42	39	46	32	38	12	8	8	2				1	262
H	775.00		2	1	3	5	15	26	21	36	25	25	12	5	2	2			1		181
E	765.00			1	3	11	8	17	18	13	15	8	4	3	1	1					103
I	755.00		1	1	6	6	8	11	10	8	2	4		1	2	1					61
G	745.00			3	2	2	3	5	3	6	3	1	3		2						33
H	735.00			2	2		2		2	2	1	1	1								13
T	725.00		1					3													4
	715.00						1				1										2
	705.00																				0
	695.00																				0
	685.00							1													1
		1	8	13	27	66	125	238	269	353	346	342	250	168	101	58	26	19	8	2	2420

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-EYE HEIGHT/SITTING	809.50	30.16	(0.436)*Y + (546.138)	27.77
Y-BUTTOCK-KNEE LNGTH	604.03	27.02	(0.350)*X + (320.740)	24.88

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CORRELATION COEFFICIENT 0.391 (BASED ON ORIGINAL DATA) 0.388 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.397	1.278	17+2401	0.86
Y AS A FUNCTION OF X	0.395	0.794	19+2399	-0.58

BIVARIATE FREQUENCY TABLE FOR
SEATED EYE HEIGHT AND BUTTOCK-KNEE LENGTH

BUTTOCK-KNEE LENGTH

	514 .00	524 .00	534 .00	544 .00	554 .00	564 .00	574 .00	584 .00	594 .00	604 .00	614 .00	624 .00	634 .00	644 .00	654 .00	664 .00	674 .00	684 .00	694 .00	TOTAL
905.00								0.0				0.0		0.0						0.1
895.00										0.0	0.1	0.1	0.0	0.1						0.3
S 885.00								0.1		0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.0			0.8
E 875.00								0.0	0.1	0.2	0.2	0.2	0.3	0.2	0.2		0.1			1.5
A 865.00							0.2	0.2	0.2	0.4	0.3	0.5	0.4	0.1	0.3	0.0	0.1	0.0		2.6
T 855.00						0.2	0.1	0.2	0.4	0.3	0.5	0.7	0.5	0.6	0.1	0.2	0.1			3.9
E 845.00					0.0	0.1	0.2	0.5	0.7	0.7	1.2	0.8	0.3	0.4	0.3	0.2	0.1	0.0		5.5
D 835.00		0.0			0.0	0.2	0.4	0.6	1.2	1.4	1.7	1.1	0.8	0.5	0.3	0.2	0.1	0.0	0.0	8.8
825.00				0.0	0.2	0.3	1.1	1.0	1.4	1.9	1.6	1.7	0.9	0.5	0.2	0.1	0.0	0.0		11.0
E 815.00			0.0	0.1	0.2	0.6	0.9	1.4	1.7	2.3	2.0	2.0	1.1	0.4	0.2	0.1	0.1	0.1		13.3
Y 805.00			0.0	0.1	0.3	0.7	0.7	1.4	2.2	2.0	1.7	1.0	0.9	0.4	0.4	0.1	0.1	0.0		12.1
E 795.00		0.0	0.0	0.0	0.5	0.7	1.9	1.9	2.1	1.7	1.5	0.8	0.9	0.3	0.1	0.0	0.1			12.7
785.00	0.0	0.1	0.1	0.2	0.3	0.7	1.7	1.6	1.9	1.3	1.6	0.5	0.3	0.3	0.1				0.0	10.8
H 775.00		0.1	0.0	0.1	0.2	0.6	1.1	0.9	1.5	1.0	1.0	0.5	0.2	0.1	0.1			0.0		7.5
E 765.00			0.0	0.1	0.5	0.3	0.7	0.7	0.5	0.6	0.3	0.2	0.1	0.0	0.0					4.3
I 755.00		0.0	0.0	0.2	0.2	0.3	0.5	0.4	0.3	0.1	0.2		0.0	0.1	0.0					2.5
G 745.00			0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.0	0.1		0.1						1.4
H 735.00			0.1	0.1		0.1		0.1	0.1	0.0	0.0	0.0								0.5
T 725.00		0.0					0.1													0.2
715.00						0.0				0.0										0.1
705.00																				0.
695.00																				0.
685.00							0.0													0.0
	0.0	0.3	0.5	1.1	2.7	5.2	9.8	11.1	14.6	14.3	14.1	10.3	6.9	4.2	2.4	1.1	0.8	0.3	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 2420.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-EYE HEIGHT/SITTING	809.50	30.16	(0.436)*Y + (546.138)	27.77
Y-BUTTOCK-KNEE LNGTH	604.03	27.02	(0.350)*X + (320.740)	24.88

***

CORRELATION COEFFICIENT 0.391 (BASED ON ORIGINAL DATA) 0.388 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.397	1.278	17+2401	0.86
Y AS A FUNCTION OF X	0.395	0.794	19+2399	-0.58

BIVARIATE FREQUENCY TABLE FOR
KNEE HEIGHT AND BUTTOCK-KNEE LENGTH

BUTTOCK-KNEE LENGTH

KNEE HEIGHT	514 .00	524 .00	534 .00	544 .00	554 .00	564 .00	574 .00	584 .00	594 .00	604 .00	614 .00	624 .00	634 .00	644 .00	654 .00	664 .00	674 .00	684 .00	694 .00	TOTAL
645.00																1			1	2
635.00																	3			3
625.00												2		3	2	5	6			18
K 615.00												3	3	3	5	4	1	4		23
N 605.00										3	4	8	12	11	10	5	4		1	58
E 595.00								1	6	9	21	29	18	27	15	5	4	4		139
E 585.00							2	1	7	19	32	55	42	13	15	4				190
575.00						2	2	10	23	43	77	53	49	25	7	1	1			292
H 565.00					1	2	7	30	50	87	76	65	32	10	3	1				364
E 555.00					2	7	28	53	75	90	69	23	11	4						362
I 545.00					5	15	60	71	90	64	37	10	2	5	1					360
G 535.00		1	2	2	11	34	63	63	62	19	22	2								281
H 525.00				5	20	33	41	29	31	12	3									174
T 515.00		2	4	9	13	15	30	8	8		1									90
505.00		1	2	6	9	13	4	3	1											39
495.00		2	3	3	2	4	1													15
485.00	1		2	2	3															8
475.00		2																		2
	1	8	13	27	66	125	238	269	353	346	342	250	168	101	58	26	19	8	2	2420

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-KNEE HEIGHT/SITT'G	557.64	24.95	(0.725)*Y + (119.924)	15.46
Y-BUTTOCK-KNEE LNGTH	604.03	27.02	(0.850)*X + (129.875)	16.74

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CORRELATION COEFFICIENT 0.785 (BASED ON ORIGINAL DATA) 0.776 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.779	1.575	17+2401	1.53
Y AS A FUNCTION OF X	0.777	0.467	16+2402	-1.78

BIVARIATE FREQUENCY TABLE FOR
KNEE HEIGHT AND BUTTOCK-KNEE LENGTH

BUTTOCK-KNEE LENGTH

KNEE HEIGHT	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	644.00	654.00	664.00	674.00	684.00	694.00	TOTAL
645.00																0.0			0.0	0.1
635.00																	0.1			0.1
625.00												0.1		0.1	0.1	0.2	0.2			0.7
K 615.00												0.1	0.1	0.1	0.2	0.2	0.0	0.2		1.0
N 605.00										0.1	0.2	0.3	0.5	0.5	0.4	0.2	0.2		0.0	2.4
E 595.00								0.0	0.2	0.4	0.9	1.2	0.7	1.1	0.6	0.2	0.2	0.2		5.7
E 585.00							0.1	0.0	0.3	0.8	1.3	2.3	1.7	0.5	0.6	0.2				7.9
575.00						0.1	0.1	0.4	1.0	1.8	3.2	2.2	2.0	1.0	0.3	0.0	0.0			12.1
H 565.00					0.0	0.1	0.3	1.2	2.1	3.6	3.1	2.7	1.3	0.4	0.1	0.0				15.0
E 555.00					0.1	0.3	1.2	2.2	3.1	3.7	2.9	1.0	0.5	0.2						15.0
I 545.00					0.2	0.6	2.5	2.9	3.7	2.6	1.5	0.4	0.1	0.2	0.0					14.9
G 535.00		0.0	0.1	0.1	0.5	1.4	2.6	2.6	2.6	0.8	0.9	0.1								11.6
H 525.00				0.2	0.8	1.4	1.7	1.2	1.3	0.5	0.1									7.2
T 515.00		0.1	0.2	0.4	0.5	0.6	1.2	0.3	0.3		0.0									3.7
505.00		0.0	0.1	0.2	0.4	0.5	0.2	0.1	0.0											1.6
495.00		0.1	0.1	0.1	0.1	0.2	0.0													0.6
485.00	0.0		0.1	0.1	0.1															0.3
475.00		0.1																		0.1
	0.0	0.3	0.5	1.1	2.7	5.2	9.8	11.1	14.6	14.3	14.1	10.3	6.9	4.2	2.4	1.1	0.8	0.3	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 2420.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-KNEE HEIGHT/SITT'G	557.64	24.95	(0.725)*Y + (119.924)	15.46
Y-BUTTOCK-KNEE LNGTH	604.03	27.02	(0.850)*X + (129.875)	16.74

***

CORRELATION COEFFICIENT 0.785 (BASED ON ORIGINAL DATA) 0.776 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.779	1.575	17+2401	1.53
Y AS A FUNCTION OF X	0.777	0.467	16+2402	-1.78

BIVARIATE FREQUENCY TABLE FOR
SEATED HEIGHT AND STATURE

STATURE

		1569.00	1589.00	1609.00	1629.00	1649.00	1669.00	1689.00	1709.00	1729.00	1749.00	1769.00	1789.00	1809.00	1829.00	1849.00	1869.00	1889.00	1909.00	1929.00	1949.00	1969.00	TOTAL
	1045.00																				1		1
	1035.00																1			1			2
	1025.00																		3	1			4
	1015.00													1			3	3	1	1			9
	1005.00															2	7	3	5	2	2	1	22
S	995.00												4	3	4	11	13	14	6	6			61
E	985.00												4	8	9	16	15	9	6	2		1	70
A	975.00										1	2	18	20	15	14	26	7	1	2	1		107
T	965.00									1	7	14	19	34	25	23	24	8	1	1			157
E	955.00							1	2	4	14	31	44	54	33	20	11	6	3	2			225
D	945.00					1			5	13	32	49	57	52	39	21	13	1					283
	935.00							2	7	35	47	55	67	42	24	10	4	1	1				295
H	925.00						3	8	39	49	44	62	43	18	14	7	3						290
E	915.00				1	3	6	11	36	56	56	51	34	15	5	1							275
I	905.00				2	5	13	28	51	55	34	26	14	8	3		1			1			241
G	895.00				1	11	18	16	36	24	10	16	3	4									139
H	885.00	1	1		4	6	18	24	21	20	9	8		1									113
T	875.00			2	4	9	12	15	15	7	8	2											74
	865.00			4	5	2	5	6	2	5			1	1									31
	855.00		2	3	3		3			1													12
	845.00				2	3																	5
	835.00				1		1	1															3
	825.00																						0
	815.00																						0
	805.00		1																				1
		1	4	9	23	40	79	112	214	270	262	316	308	261	171	125	121	52	27	19	4	2	2420

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-SITTING HEIGHT	931.84	31.76	(0.404)*Y + (214.876)	19.56
Y-HEIGHT (STATURE)	1773.43	61.88	(1.535)*X + (343.136)	38.12

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CORRELATION COEFFICIENT 0.788 (BASED ON ORIGINAL DATA) 0.781 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.783	1.267	19+2399	0.86
Y AS A FUNCTION OF X	0.783	0.901	21+2397	-0.23

BIVARIATE FREQUENCY TABLE FOR
SEATED HEIGHT AND STATURE

STATURE

SEATED HEIGHT	1569.00	1589.00	1609.00	1629.00	1649.00	1669.00	1689.00	1709.00	1729.00	1749.00	1769.00	1789.00	1809.00	1829.00	1849.00	1869.00	1889.00	1909.00	1929.00	1949.00	1969.00	TOTAL
1045.00																				0.0		0.0
1035.00																0.0			0.0			0.1
1025.00																		0.1	0.0			0.2
1015.00													0.0			0.1	0.1	0.0	0.0			0.4
1005.00															0.1	0.3	0.1	0.2	0.1	0.1	0.0	0.9
995.00												0.2	0.1	0.2	0.5	0.5	0.6	0.2	0.2			2.5
985.00												0.2	0.3	0.4	0.7	0.6	0.4	0.2	0.1		0.0	2.9
975.00										0.0	0.1	0.7	0.8	0.6	0.6	1.1	0.3	0.0	0.1	0.0		4.4
965.00									0.0	0.3	0.6	0.8	1.4	1.0	1.0	1.0	0.3	0.0	0.0			6.5
955.00							0.0	0.1	0.2	0.6	1.3	1.8	2.2	1.4	0.8	0.5	0.2	0.1	0.1			9.3
945.00					0.0			0.2	0.5	1.3	2.0	2.4	2.1	1.6	0.9	0.5	0.0					11.7
935.00							0.1	0.3	1.4	1.9	2.3	2.8	1.7	1.0	0.4	0.2	0.0	0.0				12.2
925.00						0.1	0.3	1.6	2.0	1.8	2.6	1.8	0.7	0.6	0.3	0.1						12.0
915.00				0.0	0.1	0.2	0.5	1.5	2.3	2.3	2.1	1.4	0.6	0.2	0.0							11.4
905.00				0.1	0.2	0.5	1.2	2.1	2.3	1.4	1.1	0.6	0.3	0.1		0.0			0.0			10.0
895.00				0.0	0.5	0.7	0.7	1.5	1.0	0.4	0.7	0.1	0.2									5.7
885.00	0.0	0.0		0.2	0.2	0.7	1.0	0.9	0.8	0.4	0.3		0.0									4.7
875.00			0.1	0.2	0.4	0.5	0.6	0.6	0.3	0.3	0.1											3.1
865.00			0.2	0.2	0.1	0.2	0.2	0.1	0.2			0.0	0.0									1.3
855.00		0.1	0.1	0.1		0.1			0.0													0.5
845.00				0.1	0.1																	0.2
835.00				0.0		0.0	0.0															0.1
825.00																						0.
815.00																						0.
805.00		0.0																				0.0
	0.0	0.2	0.4	1.0	1.7	3.3	4.6	9.8	11.2	10.8	13.1	12.7	10.8	7.1	5.2	5.0	2.1	1.1	0.8	0.2	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 2420.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-SITTING HEIGHT	931.84	31.76	(0.404)*Y + (214.876)	19.56
Y-HEIGHT (STATURE)	1773.43	61.88	(1.535)*X + (343.136)	38.12

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CORRELATION COEFFICIENT 0.788 (BASED ON ORIGINAL DATA) 0.781 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.783	1.267	19+2399	0.86
Y AS A FUNCTION OF X	0.783	0.901	21+2397	-0.23

BIVARIATE FREQUENCY TABLE FOR
SEATED EYE HEIGHT AND STATURE

STATURE

	1569.00	1589.00	1609.00	1629.00	1649.00	1669.00	1689.00	1709.00	1729.00	1749.00	1769.00	1789.00	1809.00	1829.00	1849.00	1869.00	1889.00	1909.00	1929.00	1949.00	1969.00	TOTAL
905.00																1	1		1			3
895.00																4	1	2		1		8
S 885.00														1	4	2	3	4	3	1	1	19
E 875.00												4	3	2	5	7	6	7	2			36
A 865.00											2	3	5	8	16	13	7	7	2		1	64
T 855.00									1	4	2	10	12	9	16	26	11		4	1		95
E 845.00									1	2	11	21	26	18	17	23	11		3	1		134
D 835.00								2	4	15	25	38	52	32	15	18	6	3	2			212
825.00						1		8	11	29	42	48	53	40	18	11	4	2				267
E 815.00						2	4	12	31	44	60	61	51	30	15	9	1	1				321
Y 805.00					2	4	6	27	45	34	57	53	31	17	12	4	1		1			294
E 795.00	1				3	8	15	40	61	58	62	28	13	10	6	1		1				307
785.00			1	4	6	13	25	51	55	44	25	22	10	4		1			1			262
H 775.00		1			6	18	24	40	29	21	21	15	3	1	1	1						181
E 765.00			1	2	8	21	17	19	20	5	5	4	1									103
I 755.00			2	6	8	8	14	10	7	4	2											61
G 745.00		1	2	6	5	1	5	4	4	2	2	1										33
H 735.00		1	2	3		3	1	1	1				1									13
T 725.00			1	1	2																	4
715.00				1			1															2
705.00																						0
695.00																						0
685.00		1																				1
	1	4	9	23	40	79	112	214	270	262	316	308	261	171	125	121	52	27	19	4	2	2420

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-EYE HEIGHT/SITTING	809.50	30.16	(0.361)*Y + (170.027)	20.30
Y-HEIGHT (STATURE)	1773.43	61.88	(1.517)*X + (545.037)	41.64

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CORRELATION COEFFICIENT 0.740 (BASED ON ORIGINAL DATA) 0.735 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.738	1.437	19+2399	1.29
Y AS A FUNCTION OF X	0.736	0.624	19+2399	-1.24

BIVARIATE FREQUENCY TABLE FOR
SEATED EYE HEIGHT AND STATURE

STATURE

		1569.00	1589.00	1609.00	1629.00	1649.00	1669.00	1689.00	1709.00	1729.00	1749.00	1769.00	1789.00	1809.00	1829.00	1849.00	1869.00	1889.00	1909.00	1929.00	1949.00	1969.00	TOTAL
	905.00																0.0	0.0		0.0			0.1
	895.00																0.2	0.0	0.1		0.0		0.3
S	885.00														0.0	0.2	0.1	0.1	0.2	0.1	0.0	0.0	0.8
E	875.00												0.2	0.1	0.1	0.2	0.3	0.2	0.3	0.1			1.5
A	865.00											0.1	0.1	0.2	0.3	0.7	0.5	0.3	0.3	0.1		0.0	2.6
T	855.00									0.0	0.2	0.1	0.4	0.5	0.3	0.7	1.1	0.5		0.2	0.0		3.9
E	845.00									0.0	0.1	0.5	0.9	1.1	0.7	0.7	1.0	0.5		0.1	0.0		5.5
D	835.00								0.1	0.2	0.6	1.0	1.6	2.1	1.3	0.6	0.7	0.2	0.1	0.1			8.8
	825.00						0.0		0.3	0.5	1.2	1.7	2.0	2.2	1.7	0.7	0.5	0.2	0.1				11.0
E	815.00						0.1	0.2	0.5	1.3	1.8	2.5	2.5	2.1	1.2	0.6	0.4	0.0	0.0				13.3
Y	805.00					0.1	0.2	0.2	1.1	1.9	1.4	2.4	2.2	1.3	0.7	0.5	0.2	0.0		0.0			12.1
E	795.00	0.0				0.1	0.3	0.6	1.7	2.5	2.4	2.6	1.2	0.5	0.4	0.2	0.0		0.0				12.7
	785.00			0.0	0.2	0.2	0.5	1.0	2.1	2.3	1.8	1.0	0.9	0.4	0.2		0.0			0.0			10.8
H	775.00		0.0			0.2	0.7	1.0	1.7	1.2	0.9	0.9	0.6	0.1	0.0	0.0	0.0						7.5
E	765.00			0.0	0.1	0.3	0.9	0.7	0.8	0.8	0.2	0.2	0.2	0.0									4.3
I	755.00			0.1	0.2	0.3	0.3	0.6	0.4	0.3	0.2	0.1											2.5
G	745.00		0.0	0.1	0.2	0.2	0.0	0.2	0.2	0.2	0.1	0.1	0.0										1.4
H	735.00		0.0	0.1	0.1		0.1	0.0	0.0	0.0				0.0									0.5
T	725.00			0.0	0.0	0.1																	0.2
	715.00				0.0			0.0															0.1
	705.00																						0.
	695.00																						0.
	685.00		0.0																				0.0
		0.0	0.2	0.4	1.0	1.7	3.3	4.6	8.8	11.2	10.8	13.1	12.7	10.8	7.1	5.2	5.0	2.1	1.1	0.8	0.2	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 2420.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-EYE HEIGHT/SITTING	809.50	30.16	(0.361)*Y + (170.027)	20.30
Y-HEIGHT (STATURE)	1773.43	61.88	(1.517)*X + (545.037)	41.64

***

CORRELATION COEFFICIENT 0.740 (BASED ON ORIGINAL DATA) 0.735 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.738	1.437	19+2399	1.29
Y AS A FUNCTION OF X	0.736	0.624	19+2399	-1.24

BIVARIATE FREQUENCY TABLE FOR
KNEE HEIGHT AND STATURE

STATURE

		1569.00	1589.00	1609.00	1629.00	1649.00	1669.00	1689.00	1709.00	1729.00	1749.00	1769.00	1789.00	1809.00	1829.00	1849.00	1869.00	1889.00	1909.00	1929.00	1949.00	1969.00	TOTAL
	645.00																			1	1		2
	635.00															1				2			3
	625.00																3	1	2	8	2	2	18
K	615.00															3	7	4	4	5			23
N	605.00										1			1	4	8	23	12	8		1		58
E	595.00											1	4	15	23	29	35	20	11	1			139
E	585.00										3	6	21	29	48	44	27	9	1	2			190
	575.00								2	2	7	39	54	84	52	27	19	5	1				292
H	565.00								4	17	24	84	98	79	39	11	7	1					364
E	555.00						1	4	15	42	71	90	89	44	4	2							362
I	545.00						4	11	55	85	97	68	31	8	1								360
G	535.00				1	1	17	33	64	83	47	24	10	1									281
H	525.00					6	23	46	51	34	10	3	1										174
T	515.00		1	1	10	19	20	13	17	6	2	1											90
	505.00			3	5	6	13	5	6	1													39
	495.00	1		3	4	6	1																15
	485.00		2	2	2	2																	8
	475.00		1		1																		2
		1	4	9	23	40	79	112	214	270	262	316	308	261	171	125	121	52	27	19	4	2	2420

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-KNEE HEIGHT/SITT'G	557.64	24.95	(0.356)*Y + (-73.378)	11.73
Y-HEIGHT (STATURE)	1773.43	61.88	(2.189)*X + (552.751)	29.10

***

CORRELATION COEFFICIENT 0.883 (BASED ON ORIGINAL DATA) 0.872 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.873	1.126	19+2399	0.48
Y AS A FUNCTION OF X	0.873	1.007	16+2402	0.14

BIVARIATE FREQUENCY TABLE FOR
KNEE HEIGHT AND STATURE

STATURE

KNEE HEIGHT	1569.00	1589.00	1609.00	1629.00	1649.00	1669.00	1689.00	1709.00	1729.00	1749.00	1769.00	1789.00	1809.00	1829.00	1849.00	1869.00	1889.00	1909.00	1929.00	1949.00	1969.00	TOTAL
645.00																			0.0	0.0		0.1
635.00															0.0				C.1			0.1
625.00																0.1	0.0	0.1	0.3	0.1	0.1	0.7
K 615.00															0.1	0.3	0.2	0.2	C.2			1.0
N 605.00										0.0			0.0	0.2	0.3	1.0	0.5	0.3		0.0		2.4
E 595.00											0.0	0.2	0.6	1.0	1.2	1.4	0.8	0.5	0.0			5.7
E 585.00										0.1	0.2	0.9	1.2	2.0	1.8	1.1	0.4	0.0	0.1			7.9
575.00								0.1	0.1	0.3	1.6	2.2	3.5	2.1	1.1	0.8	0.2	0.0				12.1
H 565.00								0.2	C.7	1.0	3.5	4.0	3.3	1.6	0.5	0.3	0.0					15.0
E 555.00						0.0	0.2	0.6	1.7	2.9	3.7	3.7	1.8	0.2	0.1							15.0
I 545.00						0.2	0.5	2.3	3.5	4.0	2.8	1.3	0.3	0.0								14.9
G 535.00				0.0	0.0	0.7	1.4	2.6	3.4	1.9	1.0	0.4	0.0									11.6
H 525.00					0.2	1.0	1.9	2.1	1.4	0.4	0.1	0.0										7.2
T 515.00		0.0	0.0	0.4	0.8	0.8	0.5	0.7	C.2	0.1	0.0											3.7
505.00			0.1	0.2	0.2	0.5	0.2	0.2	0.0													1.6
495.00	0.0		0.1	C.2	0.2	0.0																0.6
485.00		0.1	0.1	0.1	0.1																	0.3
475.00		0.0		0.0																		0.1
	0.0	0.2	0.4	1.0	1.7	3.3	4.6	8.8	11.2	10.8	13.1	12.7	10.8	7.1	5.2	5.0	2.1	1.1	0.8	0.2	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 2420.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-KNEE HEIGHT/SITT'G	557.64	24.95	(0.356)*Y + (-73.378)	11.73
Y-HEIGHT (STATURE)	1773.43	61.88	(2.189)*X + (552.751)	29.10

***

CORRELATION COEFFICIENT 0.883 (BASED ON OPIGINAL DATA) 0.872 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.873	1.126	19+2399	0.48
Y AS A FUNCTION OF X	0.873	1.007	16+2402	0.14

BIVARIATE FREQUENCY TABLE FOR
BUTTOCK-KNEE LNGTH AND STATURE

STATURE

		1569.00	1589.00	1609.00	1629.00	1649.00	1669.00	1689.00	1709.00	1729.00	1749.00	1769.00	1789.00	1809.00	1829.00	1849.00	1869.00	1889.00	1909.00	1929.00	1949.00	1969.00	TOTAL
B	695.00																		1	1			2
U	685.00														1	1	1	3	2				8
T	675.00													1		1	3	4	3	6		1	19
T	665.00													1	2	3	11	2		4	2	1	26
O	655.00										1	3	1	6	7	10	16	7	4	3			58
C	645.00									2	4	2	10	17	13	15	17	14	4	3			101
K	635.00									1	5	18	19	37	27	20	26	9	5	1			168
-	625.00								1	9	7	30	42	50	40	32	22	9	5	1	2		250
K	615.00						1	3	11	20	39	63	77	47	34	27	15	3	2				342
N	605.00						1	12	16	28	59	62	63	59	29	10	5	1	1				346
E	595.00					1	7	20	44	65	57	68	50	23	12	4	2						353
E	585.00				1		10	18	49	53	49	42	24	15	4	2	2						269
	575.00		1		5	10	23	27	49	48	30	22	16	4	2		1						238
L	565.00			1	6	10	13	19	26	28	10	5	6	1									125
N	555.00	1		1	1	8	16	8	14	15	1	1											66
G	545.00		1	4	4	6	4	4	3	1													27
T	535.00		1	2	2	4	3	1															13
H	525.00		1	1	3	1	1		1														8
	515.00				1																		1
		1	4	9	23	40	79	112	214	270	262	316	308	261	171	125	121	52	27	19	4	2	2420

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BUTTOCK-KNEE LNGTH	604.03	27.02	(0.332)*Y + (15.415)	17.56
Y-HEIGHT (STATURE)	1773.43	61.88	(1.740)*X + (722.285)	40.22

***

CORRELATION COEFFICIENT 0.760 (BASED ON ORIGINAL DATA) 0.753 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.755	1.237	19+2399	0.78
Y AS A FUNCTION OF X	0.756	1.633	17+2401	1.66

BIVARIATE FREQUENCY TABLE FOR
BUTTOCK-KNEE LNGTH AND STATURE

STATURE

		1569.00	1589.00	1609.00	1629.00	1649.00	1669.00	1689.00	1709.00	1729.00	1749.00	1769.00	1789.00	1809.00	1829.00	1849.00	1869.00	1889.00	1909.00	1929.00	1949.00	1969.00	TOTAL
B	695.00																		0.0	0.0			0.1
U	685.00														0.0	0.0	0.0	0.1	0.1				0.3
T	675.00													0.0		0.0	0.1	0.2	0.1	0.2		0.0	0.8
T	665.00													0.0	0.1	0.1	0.5	0.1		0.2	0.1	0.0	1.1
O	655.00										0.0	0.1	0.0	0.2	0.3	0.4	0.7	0.3	0.2	0.1			2.4
C	645.00									0.1	0.2	0.1	0.4	0.7	0.5	0.6	0.7	0.6	0.2	0.1			4.2
K	635.00									0.0	0.2	0.7	0.8	1.5	1.1	0.8	1.1	0.4	0.2	0.0			6.9
-	625.00								0.0	0.4	0.3	1.2	1.7	2.1	1.7	1.3	0.9	0.4	0.2	0.0	0.1		10.3
K	615.00						0.0	0.1	0.5	0.8	1.6	2.6	3.2	1.9	1.4	1.1	0.6	0.1	0.1				14.1
N	605.00						0.0	0.5	0.7	1.2	2.4	2.6	2.6	2.4	1.2	0.4	0.2	0.0	0.0				14.3
E	595.00					0.0	0.3	0.8	1.8	2.7	2.4	2.8	2.1	1.0	0.5	0.2	0.1						14.6
E	585.00				0.0		0.4	0.7	2.0	2.2	2.0	1.7	1.0	0.6	0.2	0.1	0.1						11.1
	575.00		0.0		0.2	0.4	1.0	1.1	2.0	2.0	1.2	0.9	0.7	0.2	0.1		0.0						9.8
L	565.00			0.0	0.2	0.4	0.5	0.8	1.1	1.2	0.4	0.2	0.2	0.0									5.2
N	555.00	0.0		0.0	0.0	0.3	0.7	0.3	0.6	0.6	0.0	0.0											2.7
G	545.00		0.0	0.2	0.2	0.2	0.2	0.2	0.1	0.0													1.1
T	535.00		0.0	0.1	0.1	0.2	0.1	0.0															0.5
H	525.00		0.0	0.0	0.1	0.0	0.0		0.0														0.3
	515.00				0.0																		0.0
		0.0	0.2	0.4	1.0	1.7	3.3	4.6	8.8	11.2	10.8	13.1	12.7	10.8	7.1	5.2	5.0	2.1	1.1	0.8	0.2	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 2420.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BUTTOCK-KNEE LNGTH	604.03	27.02	(0.332)*Y + (15.415)	17.56
Y-HEIGHT (STATURE)	1773.43	61.88	(1.740)*X + (722.285)	40.22

***

CORRELATION COEFFICIENT 0.760 (BASED ON ORIGINAL DATA) 0.753 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.755	1.237	19+2399	0.78
Y AS A FUNCTION OF X	0.756	1.633	17+2401	1.66

BIVARIATE FREQUENCY TABLE FOR
SEATD SHLDR BRDTH AND STATURE

STATURE

	1569.00	1589.00	1609.00	1629.00	1649.00	1669.00	1689.00	1709.00	1729.00	1749.00	1769.00	1789.00	1809.00	1829.00	1849.00	1869.00	1889.00	1909.00	1929.00	1949.00	1969.00	TOTAL
S 565.00									1		1		1	1								4
E 555.00										1	1			2	1	1			1			7
A 545.00										1	3	4	1	2	2	1	3		3			20
T 535.00					1		2		4	7	4	7	8	6	11	4	3	1	1			59
D 525.00					1		1	8	7	10	12	15	13	8	2	12	7	2				98
515.00					1	1	6	9	6	17	19	20	20	11	13	10	4	4	2	2		145
S 505.00			1		1	3	5	14	17	18	20	28	29	17	16	25	9	8	3			214
H 495.00				3	4	7	19	23	34	35	48	51	44	23	17	17	4	7	6	1		343
L 485.00				2	6	21	20	23	45	35	45	47	45	31	19	17	9	2			1	368
D 475.00		1		5	5	15	18	38	45	50	53	43	33	28	16	11	8	1	3	1		374
R 465.00	1			3	5	12	8	30	50	33	51	39	35	19	12	13	2	2				315
455.00			2	3	6	10	14	33	24	35	25	32	20	12	9	6	3					234
B 445.00		2	3	2	5	7	11	18	17	12	12	13	8	7	5	2					1	125
R 435.00		1	2	1	3	2	4	7	12	4	17	4	3	2	1	1						64
D 425.00			1	3	1		3	7	6	4	4	5		2								36
T 415.00				1			1	3	1		1				1	1						9
H 405.00					1			1	1				1									4
395.00						1																1
	1	4	9	23	40	79	112	214	270	262	316	308	261	171	125	121	52	27	19	4	2	2420

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BIDELTOID BREADTH	482.42	25.64	(0.125)*Y + (260.195)	24.44
Y-HEIGHT (STATURE)	1773.43	61.88	(0.730)*X + (1421.365)	58.98

***

CORRELATION COEFFICIENT 0.302 (BASED ON ORIGINAL DATA) 0.294 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.307	1.123	19+2399	0.47
Y AS A FUNCTION OF X	0.305	1.164	16+2402	0.55

BIVARIATE FREQUENCY TABLE FOR
SEATD SHLDR BRDTH AND STATURE

STATURE

	1569.00	1589.00	1609.00	1629.00	1649.00	1669.00	1689.00	1709.00	1729.00	1749.00	1769.00	1789.00	1809.00	1829.00	1849.00	1869.00	1889.00	1909.00	1929.00	1949.00	1969.00	TOTAL
S 565.00									0.0		0.0		0.0	0.0								0.2
E 555.00										0.0	0.0			0.1	0.0	0.0			0.0			0.3
A 545.00										0.0	0.1	0.2	0.0	0.1	0.1	0.0	0.1		0.1			0.8
T 535.00					0.0		0.1		0.2	0.3	0.2	0.3	0.3	0.2	0.5	0.2	0.1	0.0	0.0			2.4
D 525.00					0.0		0.0	0.3	0.3	0.4	0.5	0.6	0.5	0.3	0.1	0.5	0.3	0.1				4.0
515.00					0.0	0.0	0.2	0.4	0.2	0.7	0.8	0.8	0.8	0.5	0.5	0.4	0.2	0.2	0.1	0.1		6.0
S 505.00			0.0		0.0	0.1	0.2	0.6	0.7	0.7	0.8	1.2	1.2	0.7	0.7	1.0	0.4	0.3	0.1			8.8
H 495.00				0.1	0.2	0.3	0.8	1.0	1.4	1.4	2.0	2.1	1.8	1.0	0.7	0.7	0.2	0.3	0.2	0.0		14.2
L 485.00				0.1	0.2	0.9	0.8	1.0	1.9	1.4	1.9	1.9	1.9	1.3	0.8	0.7	0.4	0.1			0.0	15.2
D 475.00		0.0		0.2	0.2	0.6	0.7	1.6	1.9	2.1	2.2	1.8	1.4	1.2	0.7	0.5	0.3	0.0	0.1	0.0		15.5
R 465.00	0.0			0.1	0.2	0.5	0.3	1.2	2.1	1.4	2.1	1.6	1.4	0.8	0.5	0.5	0.1	0.1				13.0
455.00			0.1	0.1	0.2	0.4	0.6	1.4	1.0	1.4	1.0	1.3	0.8	0.5	0.4	0.2	0.1					9.7
B 445.00		0.1	0.1	0.1	0.2	0.3	0.5	0.7	0.7	0.5	0.5	0.5	0.3	0.3	0.2	0.1					0.0	5.2
R 435.00		0.0	0.1	0.0	0.1	0.1	0.2	0.3	0.5	0.2	0.7	0.2	0.1	0.1	0.0	0.0						2.6
D 425.00			0.0	0.1	0.0		0.1	0.3	0.2	0.2	0.2	0.2		0.1								1.5
T 415.00				0.0			0.0	0.1	0.0		0.0				0.0	0.0						0.4
H 405.00					0.0			0.0	0.0				0.0									0.2
395.00						0.0																0.0
	0.0	0.2	0.4	1.0	1.7	3.3	4.6	8.8	11.2	10.8	13.1	12.7	10.8	7.1	5.2	5.0	2.1	1.1	0.8	0.2	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 2420.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BIDELTOID BREADTH	482.42	25.64	(0.125)*Y + (260.195)	24.44
Y-HEIGHT (STATURE)	1773.43	61.88	(0.730)*X + (1421.365)	58.98

***

CORRELATION COEFFICIENT 0.302 (BASED ON ORIGINAL DATA) 0.294 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.307	1.123	19+2399	0.47
Y AS A FUNCTION OF X	0.305	1.164	16+2402	0.55

BIVARIATE FREQUENCY TABLE FOR
SHOULDER ELBOW LENGTH AND STATURE

STATURE

		1569.00	1589.00	1609.00	1629.00	1649.00	1669.00	1689.00	1709.00	1729.00	1749.00	1769.00	1789.00	1809.00	1829.00	1849.00	1869.00	1889.00	1909.00	1929.00	1949.00	1969.00	TOTAL
	427.50																				1		1
S	422.50																						0
H	417.50																			1			1
O	412.50														1				2	1			4
U	407.50													1			2		1	2		1	7
L	402.50													2		1	1		1	2			7
D	397.50										1				2	6	5	5	2	3		1	25
E	392.50											2	2	2	7	4	14	10	4	3			48
R	387.50											1	2	7	7	14	8	8	6	4	1		58
	382.50								1	1		5	12	22	21	18	22	10	3	1	2		118
E	377.50									4	5	13	26	30	25	21	20	3	4	2			153
L	372.50							1	4	5	14	32	33	53	28	21	18	7	3				219
B	367.50						1		6	16	27	48	44	47	31	20	11	4	1				256
O	362.50						1	2	13	19	32	48	55	30	14	7	7	4					232
W	357.50						2	9	25	35	48	53	52	27	15	7	8	1					282
	352.50				1	1	4	14	30	44	32	51	39	20	11	3	5						255
L	347.50				1	5	10	19	38	48	53	31	22	13	4	1							245
E	342.50				1	4	16	18	32	43	33	16	10	4	4	1							182
N	337.50				4	9	14	22	32	30	13	11	7	3	1								146
G	332.50	1	1		4	5	19	11	16	18	3	3	2			1							84
T	327.50			6	5	7	5	9	12	2		1											47
H	322.50		1	2	2	5	5	5	4	5	1	1	2										33
	317.50		1	1	3	3	1																9
	312.50		1		1	1	1	1	1														6
	307.50				1			1															2
		1	4	9	23	40	79	112	214	270	262	316	308	261	171	125	121	52	27	19	4	2	2420

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-SHOULDER-ELBOW LTH	359.49	17.13	(0.209)*Y + (-10.556)	11.25
Y-HEIGHT (STATURE)	1773.43	61.88	(2.723)*X + (794.409)	40.66

***

CORRELATION COEFFICIENT 0.754 (BASED ON ORIGINAL DATA) 0.745 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.747	0.686	19+2399	-0.98
Y AS A FUNCTION OF X	0.748	1.089	22+2396	0.38

BIVARIATE FREQUENCY TABLE FOR
SHOULDER ELBOW LENGTH AND STATURE

STATURE

		1569.00	1589.00	1609.00	1629.00	1649.00	1669.00	1689.00	1709.00	1729.00	1749.00	1769.00	1789.00	1809.00	1829.00	1849.00	1869.00	1889.00	1909.00	1929.00	1949.00	1969.00	TOTAL
	427.50																				0.0		0.0
S	422.50																						0.
H	417.50																			0.0			0.0
O	412.50														0.0				0.1	0.0			0.2
U	407.50													0.0			0.1		0.0	0.1		0.0	0.3
L	402.50													0.1		0.0	0.0		0.0	0.1			0.3
D	397.50										0.0				0.1	0.2	0.2	0.2	0.1	0.1		0.0	1.0
E	392.50											0.1	0.1	0.1	0.3	0.2	0.6	0.4	0.2	0.1			2.0
R	387.50											0.0	0.1	0.3	0.3	0.6	0.3	0.3	0.2	0.2	0.0		2.4
	382.50								0.0	0.0		0.2	0.5	0.9	0.9	0.7	0.9	0.4	0.1	0.0	0.1		4.9
E	377.50									0.2	0.2	0.5	1.1	1.2	1.0	0.9	0.8	0.1	0.2	0.1			6.3
L	372.50							0.0	0.2	0.2	0.6	1.3	1.4	2.2	1.2	0.9	0.7	0.3	0.1				9.0
B	367.50						0.0		0.2	0.7	1.1	2.0	1.8	1.9	1.3	0.8	0.5	0.2	0.0				10.6
O	362.50						0.0	0.1	0.5	0.8	1.3	2.0	2.3	1.2	0.6	0.3	0.3	0.2					9.6
W	357.50						0.1	0.4	1.0	1.4	2.0	2.2	2.1	1.1	0.6	0.3	0.3	0.0					11.7
	352.50				0.0	0.0	0.2	0.6	1.2	1.8	1.3	2.1	1.6	0.8	0.5	0.1	0.2						10.5
L	347.50				0.0	0.2	0.4	0.8	1.6	2.0	2.2	1.3	0.9	0.5	0.2	0.0							10.1
E	342.50				0.0	0.2	0.7	0.7	1.3	1.8	1.4	0.7	0.4	0.2	0.2	0.0							7.5
N	337.50				0.2	0.4	0.6	0.9	1.3	1.2	0.5	0.5	0.3	0.1	0.0								6.0
G	332.50	0.0	0.0		0.2	0.2	0.8	0.5	0.7	0.7	0.1	0.1	0.1			0.0							3.5
T	327.50			0.2	0.2	0.3	0.2	0.4	0.5	0.1		0.0											1.9
H	322.50		0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.1										1.4
	317.50		0.0	0.0	0.1	0.1	0.0																0.4
	312.50		0.0		0.0	0.0	0.0	0.0	0.0														0.2
	307.50				0.0			0.0															0.1
		0.0	0.2	0.4	1.0	1.7	3.3	4.6	8.8	11.2	10.8	13.1	12.7	10.8	7.1	5.2	5.0	2.1	1.1	0.8	0.2	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 2420.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-SHOULDER-ELBOW LTH	359.49	17.13	(0.209)*Y + (-10.556)	11.25
Y-HEIGHT (STATURE)	1773.43	61.88	(2.723)*X + (794.409)	40.66

***
CORRELATION COEFFICIENT 0.754 (BASED ON ORIGINAL DATA) 0.745 (BASED ON GROUPED DATA)
***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.747	0.686	19+2399	-0.98
Y AS A FUNCTION OF X	0.748	1.089	22+2396	0.38

BIVARIATE FREQUENCY TABLE FOR
KNEE HEIGHT AND SEATED SHOULDER HEIGHT

SEATED SHOULDER HEIGHT

	494.00	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	644.00	654.00	664.00	674.00	684.00	694.00	704.00	714.00	TOTAL
645.00											1			1										2
635.00											1					2								3
625.00										2			1	1	6	2		3	1		1		1	18
K 615.00									1		1	4	4	2	2	1	2	4	2					23
N 605.00										1	3	2	9	13	12	5	6	4	3					58
E 595.00							2		3	8	8	15	15	21	19	15	12	12	5	2	2			139
E 585.00						2		3	7	9	23	15	26	26	19	21	14	17	6	1	1			190
575.00						2	2	5	10	16	29	44	46	44	39	21	16	12	3	1	2			292
H 565.00						2	1	14	15	31	35	51	69	51	36	25	17	12	3	1			1	364
E 555.00					1	1	4	4	21	39	52	47	68	47	40	22	6	5	3	2				362
I 545.00						2	8	16	35	49	60	53	51	36	31	12	5	1	1					360
G 535.00					1	7	7	21	27	38	51	52	28	20	12	8	3	4			2			281
H 525.00				1		4	6	15	19	33	22	23	21	17	5	5	3							174
T 515.00	1			1	2	5	7	12	14	17	10	8	5	4	1	3								90
505.00			1	1		1	3	8	2	5	8	3	3	3	1									39
495.00				1		1	2	1	3	4	1	1		1										15
485.00					2	1	1	1	1			1		1										8
475.00										1	1													2
	1	0	1	4	6	28	43	100	158	253	306	319	345	288	223	142	84	74	27	7	8	0	2	2420

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-KNEE HEIGHT/SITT'G	557.64	24.95	(0.392)*Y + (318.546)	22.30
Y-ACROMION H'GHT/SIT	610.53	28.54	(0.512)*X + (324.757)	25.51

***

CORRELATION COEFFICIENT 0.448 (BASED ON ORIGINAL DATA) 0.442 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.447	0.724	19+2390	-0.83
Y AS A FUNCTION OF X	0.451	1.418	16+2402	1.16

BIVARIATE FREQUENCY TABLE FOR
KNEE HEIGHT AND SEATED SHOULDER HEIGHT

SEATED SHOULDER HEIGHT

	494.00	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	644.00	654.00	664.00	674.00	684.00	694.00	704.00	714.00	TOTAL
645.00											0.0			0.0										0.1
635.00											0.0					0.1								0.1
625.00										0.1			0.0	0.0	0.2	0.1		0.1	0.0		0.0		0.0	0.7
K 615.00									0.0		0.0	0.2	0.2	0.1	0.1	0.0	0.1	0.2	0.1					1.0
N 605.00										0.0	0.1	0.1	0.4	0.5	0.5	0.2	0.2	0.2	0.1					2.4
E 595.00							0.1		0.1	0.3	0.3	0.6	0.6	0.9	0.8	0.6	0.5	0.5	0.2	0.1	0.1			5.7
E 585.00						0.1		0.1	0.3	0.4	1.0	0.6	1.1	1.1	0.8	0.9	0.6	0.7	0.2	0.0	0.0			7.9
575.00						0.1	0.1	0.2	0.4	0.7	1.2	1.8	1.9	1.8	1.6	0.9	0.7	0.5	0.1	0.0	0.1			12.1
H 565.00						0.1	0.0	0.6	0.6	1.3	1.4	2.1	2.9	2.1	1.5	1.0	0.7	0.5	0.1	0.0			0.0	15.0
E 555.00					0.0	0.0	0.2	0.2	0.9	1.6	2.1	1.9	2.8	1.9	1.7	0.9	0.2	0.2	0.1	0.1				15.0
I 545.00						0.1	0.3	0.7	1.4	2.0	2.5	2.2	2.1	1.5	1.3	0.5	0.2	0.0	0.0					14.9
G 535.00					0.0	0.3	0.3	0.9	1.1	1.6	2.1	2.1	1.2	0.8	0.5	0.3	0.1	0.2			0.1			11.6
H 525.00				0.0		0.2	0.2	0.6	0.8	1.4	0.9	1.0	0.9	0.7	0.2	0.2	0.1							7.2
T 515.00	0.0			0.0	0.1	0.2	0.3	0.5	0.6	0.7	0.4	0.3	0.2	0.2	0.0	0.1								3.7
505.00			0.0	0.0		0.0	0.1	0.3	0.1	0.2	0.3	0.1	0.1	0.1	0.0									1.6
495.00				0.0		0.0	0.1	0.0	0.1	0.2	0.0	0.0		0.0										0.6
485.00					0.1	0.0	0.0	0.0	0.0			0.0		0.0										0.3
475.00										0.0	0.0													0.1
	0.0	0.	0.0	0.2	0.2	1.2	1.8	4.1	6.5	10.5	12.6	13.2	14.3	11.9	9.2	5.9	3.5	3.1	1.1	0.3	0.3	0.	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 2420.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-KNEE HEIGHT/SITT'G	557.64	24.95	(0.392)*Y + (318.546)	22.30
Y-ACROMION H'GHT/SIT	610.53	28.54	(0.512)*X + (324.757)	25.51

***

CORRELATION COEFFICIENT 0.448 (BASED ON ORIGINAL DATA) 0.442 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.447	0.724	19+2399	-0.83
Y AS A FUNCTION OF X	0.451	1.418	16+2402	1.16

BIVARIATE FREQUENCY TABLE FOR
SEATED EYE HEIGHT AND SEATED SHOULDER HEIGHT

SEATED SHOULDER HEIGHT

	494.00	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	644.00	654.00	664.00	674.00	684.00	694.00	704.00	714.00	TOTAL
905.00																		1	1				1	3
895.00																	1	1	2	2	2			8
S 885.00															1	3	2	8	2		2		1	19
E 875.00													1	2	2	6	4	13	5	2	1			36
A 865.00												1	4	6	5	17	12	12	5	1	1			64
T 855.00											1	2	4	15	23	12	15	15	4	2	2			95
E 845.00										2	5	9	11	21	31	20	21	10	4					134
D 835.00										4	14	16	39	51	45	23	13	7						212
825.00									2	7	18	39	57	57	41	28	12	4	2					267
E 815.00								1	5	15	41	65	82	56	38	11	2	3	2					321
Y 805.00							1	2	20	33	47	53	64	37	24	12	1							294
E 795.00								8	19	51	71	64	51	25	11	6	1							307
785.00						3	4	19	45	48	58	48	18	13	2	4								262
H 775.00					1	2	7	27	30	48	32	18	11	5										181
E 765.00					2	8	9	21	21	23	11	4	4											103
I 755.00				1		5	13	12	9	15	6													61
G 745.00			1	1	2	7	4	6	4	6	2													33
H 735.00						3	4	4	1	1														13
T 725.00	1			1			1		1															4
715.00					1				1															2
705.00																								0
695.00																								0
685.00				1																				1
	1	0	1	4	6	28	43	100	159	253	306	319	346	288	223	142	84	74	27	7	8	0	2	2420

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-EYE HEIGHT/SITTING	809.50	30.16	(0.823)*Y + (306.809)	18.91
Y-ACROMION H'GHT/SIT	610.53	28.54	(0.737)*X + (13.895)	17.89

***

CORRELATION COEFFICIENT 0.779 (BASED ON ORIGINAL DATA) 0.774 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.775	0.715	19+2399	-0.87
Y AS A FUNCTION OF X	0.775	0.896	19+2399	-0.22

BIVARIATE FREQUENCY TABLE FOR
SEATED EYE HEIGHT AND SEATED SHOULDER HEIGHT

SEATED SHOULDER HEIGHT

		494.00	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	644.00	654.00	664.00	674.00	684.00	694.00	704.00	714.00	TOTAL
	905.00																		0.0	0.0				0.0	0.1
	895.00																	0.0	0.0	0.1	0.1	0.1			0.3
S	885.00															0.0	0.1	0.1	0.3	0.1		0.1		0.0	0.8
E	875.00													0.0	0.1	0.1	0.2	0.2	0.5	0.2	0.1	0.0			1.5
A	865.00												0.0	0.2	0.2	0.2	0.7	0.5	0.5	0.2	0.0	0.0			2.6
T	855.00											0.0	0.1	0.2	0.6	1.0	0.5	0.6	0.6	0.2	0.1	0.1			3.9
E	845.00										0.1	0.2	0.4	0.5	0.9	1.3	0.8	0.9	0.4	0.2					5.5
D	835.00										0.2	0.6	0.7	1.6	2.1	1.9	1.0	0.5	0.3						8.8
	825.00									0.1	0.3	0.7	1.6	2.4	2.4	1.7	1.2	0.5	0.2	0.1					11.0
E	815.00								0.0	0.2	0.6	1.7	2.7	3.4	2.3	1.6	0.5	0.1	0.1	0.1					13.3
Y	805.00							0.0	0.1	0.8	1.4	1.9	2.2	2.6	1.5	1.0	0.5	0.0							12.1
E	795.00								0.3	0.8	2.1	2.9	2.6	2.1	1.0	0.5	0.2	0.0							12.7
	785.00						0.1	0.2	0.8	1.9	2.0	2.4	2.0	0.7	0.5	0.1	0.2								10.8
H	775.00					0.0	0.1	0.3	1.1	1.2	2.0	1.3	0.7	0.5	0.2										7.5
E	765.00					0.1	0.3	0.4	0.9	0.9	1.0	0.5	0.2	0.2											4.3
I	755.00				0.0		0.2	0.5	0.5	0.4	0.6	0.2													2.5
G	745.00			0.0	0.0	0.1	0.3	0.2	0.2	0.2	0.2	0.1													1.4
H	735.00						0.1	0.2	0.2	0.0	0.0														0.5
T	725.00	0.0			0.0			0.0		0.0															0.2
	715.00					0.0				0.0															0.1
	705.00																								0.
	695.00																								0.
	685.00				0.0																				0.0
		0.0	0.	0.0	0.2	0.2	1.2	1.8	4.1	6.5	10.5	12.6	13.2	14.3	11.9	9.2	5.9	3.5	3.1	1.1	0.3	0.3	0.	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 2420.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-EYE HEIGHT/SITTING	809.50	30.16	(0.823)*Y + (306.809)	18.91
Y-ACROMION H'GHT/SIT	610.53	28.54	(0.737)*X + (13.895)	17.89

***

CORRELATION COEFFICIENT 0.779 (BASED ON ORIGINAL DATA) 0.774 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.775	0.715	19+2399	-0.87
Y AS A FUNCTION OF X	0.775	0.896	19+2399	-0.22

BIVARIATE FREQUENCY TABLE FOR
SEATD SHLDR BRDTH AND SEATED SHOULDER HEIGHT

SEATED SHOULDER HEIGHT

SEATD SHLDR BRDTH	494.00	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	644.00	654.00	664.00	674.00	684.00	694.00	704.00	714.00	TOTAL
S 565.00												1	1	1	1									4
E 555.00												1		2	1		1	1	1					7
A 545.00									1		1	1	3	1	3	4	2	3		1				20
T 535.00									1	3	8	8	7	6	6	9	10		1					59
D 525.00							1	2	2	6	14	9	14	12	13	9	7	5	2		2			98
515.00							1	2	5	12	11	21	19	18	17	12	7	15	4		1			145
S 505.00						1	2	9	13	15	19	26	24	25	32	21	8	13	5		1			214
H 495.00				1	1	4	3	12	19	31	45	47	48	41	39	18	13	14	2	3	1		1	343
L 485.00					1	7	4	15	27	32	45	52	59	44	37	22	10	6	3	2	1		1	368
D 475.00				1	1	4	6	21	21	53	37	55	58	50	25	18	14	4	6					374
R 465.00					1	3	8	8	22	43	55	42	43	33	28	13	9	6	1					315
455.00			1		1	3	4	6	24	25	45	28	37	31	11	10	1	2	2	1	2			234
B 445.00				1		3	8	14	10	20	13	15	18	12	7	1	1	2						125
R 435.00				1	1	3	2	6	6	6	7	9	11	6		4	1	1						64
D 425.00	1						2	4	6	4	4	2	4	5	3			1						36
T 415.00								1	1	3	1	1				1		1						9
H 405.00							1				1	1		1										4
395.00							1																	1
	1	0	1	4	6	28	43	100	158	253	306	319	346	288	223	142	84	74	27	7	8	0	2	2420

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BIDELTOID BREADTH	482.42	25.64	(0.240)*Y + (335.871)	24.71
Y-ACROMION H'GHT/SIT	610.53	28.54	(0.297)*X + (467.077)	27.50

***

CORRELATION COEFFICIENT 0.267 (BASED ON ORIGINAL DATA) 0.267 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.281	1.012	19+2399	0.14
Y AS A FUNCTION OF X	0.277	0.886	16+2402	-0.22

BIVARIATE FREQUENCY TABLE FOR
SEATD SHLDR BRDTH AND SEATED SHOULDER HEIGHT

SEATED SHOULDER HEIGHT

	494.00	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	644.00	654.00	664.00	674.00	684.00	694.00	704.00	714.00	TOTAL
S 565.00												0.0	0.0	0.0	0.0									0.2
E 555.00												0.0		0.1	0.0		0.0	0.0	0.0					0.3
A 545.00									0.0		0.0	0.0	0.1	0.0	0.1	0.2	0.1	0.1		0.0				0.8
T 535.00									0.0	0.1	0.3	0.3	0.3	0.2	0.2	0.4	0.4		0.0					2.4
D 525.00							0.0	0.1	0.1	0.2	0.6	0.4	0.6	0.5	0.5	0.4	0.3	0.2	0.1		0.1			4.0
515.00							0.0	0.1	0.2	0.5	0.5	0.9	0.8	0.7	0.7	0.5	0.3	0.6	0.2		0.0			6.0
S 505.00						0.0	0.1	0.4	0.5	0.6	0.8	1.1	1.0	1.0	1.3	0.9	0.3	C.5	0.2		0.0			8.8
H 495.00				0.0	0.0	0.2	0.1	0.5	0.8	1.3	1.9	1.9	2.0	1.7	1.6	0.7	0.5	0.6	0.1	0.1	0.0		0.0	14.2
L 485.00					0.0	0.3	0.2	0.6	1.1	1.3	1.9	2.1	2.4	1.8	1.5	0.9	0.4	0.2	0.1	0.1	0.0		0.0	15.2
D 475.00				0.0	0.0	0.2	0.2	0.9	0.9	2.2	1.5	2.3	2.4	2.1	1.0	0.7	0.6	0.2	0.2					15.5
R 465.00					0.0	0.1	0.3	0.3	0.9	1.8	2.3	1.7	1.8	1.4	1.2	0.5	0.4	0.2	0.0					13.0
455.00			0.0		0.0	0.1	0.2	0.2	1.0	1.0	1.9	1.2	1.5	1.3	0.5	0.4	0.0	0.1	0.1	0.0	0.1			9.7
B 445.00				0.0		0.1	0.3	0.6	0.4	0.8	0.5	0.6	0.7	0.5	0.3	0.0	0.0	0.1						5.2
R 435.00				0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.3	0.4	0.5	0.2		0.2	0.0	0.0						2.6
D 425.00	0.0						0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.1			0.0						1.5
T 415.00								0.0	0.0	0.1	0.0	0.0				0.0		0.0						0.4
H 405.00							0.0				0.0	0.0		0.0										0.2
395.00							0.0																	0.0
	0.0	0.	0.0	0.2	0.2	1.2	1.8	4.1	6.5	10.5	12.6	13.2	14.3	11.9	9.2	5.9	3.5	3.1	1.1	0.3	0.3	0.	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 2420.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BIDELTOID BREADTH	482.42	25.64	(0.240)*Y + (335.871)	24.71
Y-ACROMION H'GHT/SIT	610.53	28.54	(0.297)*X + (467.077)	27.50

***

CORRELATION COEFFICIENT 0.267 (BASED ON ORIGINAL DATA) 0.267 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.281	1.012	19+2399	0.14
Y AS A FUNCTION OF X	0.277	0.886	16+2402	-0.22

BIVARIATE FREQUENCY TABLE FOR
SHOULDER ELBOW LENGTH AND SEATED SHOULDER HEIGHT

SEATED SHOULDER HEIGHT

SHOULDER ELBOW LENGTH	494.00	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	644.00	654.00	664.00	674.00	684.00	694.00	704.00	714.00	TOTAL
427.50																					1			1
422.50																								0
417.50																1								1
412.50										1	1	1				1								4
407.50										1	1		1			2		2						7
402.50												1	2		2	1			1					7
397.50									1		1	2	3	4	2	4	4	2		2				25
392.50										1	3	4	5	11	6	4	5	5	3				1	48
387.50									1	2	2	3	9	9	9	10	5	6	1		1			58
382.50							1	3	1	5	11	10	19	23	16	10	5	10	4					118
377.50						1		3	2	4	14	22	24	24	26	10	6	8	6	2	1			153
372.50						3	1	2	6	16	21	24	47	22	23	21	15	10	4	1	3			219
367.50						2		8	17	13	25	36	45	41	26	16	12	10	5					256
362.50						1	1	6	20	18	28	38	29	30	34	15	5	7						232
357.50						1	4	7	20	29	40	38	40	35	24	23	13	5	2				1	282
352.50						1	1	13	18	44	40	28	38	28	21	5	8	5	1	2	2			255
347.50					1	3	10	17	19	38	40	35	32	23	16	7	2	2						245
342.50	1					5	9	10	18	24	28	28	20	21	11	4	2	1						182
337.50					2	1	5	12	17	23	19	28	17	8	6	5	2	1						146
332.50				2		5	3	8	8	17	19	10	5	7										84
327.50				2	2	2	1	7	6	10	6	5	3	1		2								47
322.50			1			1	3	1	3	6	5	3	7	1	1	1								33
317.50					1	2	2	1			2	1												9
312.50							1	2	1	1		1												6
307.50							1					1												2
	1	0	1	4	6	28	43	100	158	253	306	319	346	288	223	142	84	74	27	7	8	0	2	2420

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-SHOULDER-ELBOW LTH	359.49	17.13	(0.257)*Y + (202.566)	15.48
Y-ACROMION H'GHT/SIT	610.53	28.54	(0.714)*X + (354.014)	25.79

***

CORRELATION COEFFICIENT 0.428 (BASED ON ORIGINAL DATA) 0.425 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.431	0.776	19+2399	-0.64
Y AS A FUNCTION OF X	0.438	1.530	22+2396	1.60

BIVARIATE FREQUENCY TABLE FOR
SHOULDER ELBOW LENGTH AND SEATED SHOULDER HEIGHT

SEATED SHOULDER HEIGHT

	494 .00	504 .00	514 .00	524 .00	534 .00	544 .00	554 .00	564 .00	574 .00	584 .00	594 .00	604 .00	614 .00	624 .00	634 .00	644 .00	654 .00	664 .00	674 .00	684 .00	694 .00	704 .00	714 .00	TOTAL
427.50																					0.0			0.0
S 422.50																								0.
H 417.50																0.0								0.0
O 412.50										0.0	0.0	0.0				0.0								0.2
U 407.50										0.0	0.0		0.0			0.1		0.1						0.3
L 402.50												0.0	0.1		0.1	0.0			0.0					0.3
D 397.50									0.0		0.0	0.1	0.1	0.2	0.1	0.2	0.2	0.1		0.1				1.0
E 392.50										0.0	0.1	0.2	0.2	0.5	0.2	0.2	0.2	0.2	0.1				0.0	2.0
R 387.50									0.0	0.1	0.1	0.1	0.4	0.4	0.4	0.4	0.2	0.2	0.0		0.0			2.4
382.50							0.0	0.1	0.0	0.2	0.5	0.4	0.8	1.0	0.7	0.4	0.2	0.4	0.2					4.9
E 377.50						0.0		0.1	0.1	0.2	0.6	0.9	1.0	1.0	1.1	0.4	0.2	0.3	0.2	0.1	0.0			6.3
L 372.50						0.1	0.0	0.1	0.2	0.7	0.9	1.0	1.9	0.9	1.0	0.9	0.6	0.4	0.2	0.0	0.1			9.0
B 367.50						0.1		0.3	0.7	0.5	1.0	1.5	1.9	1.7	1.1	0.7	0.5	0.4	0.2					10.6
O 362.50						0.0	0.0	0.2	0.8	0.7	1.2	1.6	1.2	1.2	1.4	0.6	0.2	0.3						9.6
W 357.50						0.0	0.2	0.3	0.8	1.2	1.7	1.6	1.7	1.4	1.0	1.0	0.5	0.2	0.1				0.0	11.7
352.50						0.0	0.0	0.5	0.7	1.8	1.7	1.2	1.6	1.2	0.9	0.2	0.3	0.2	0.0	0.1	0.1			10.5
L 347.50					0.0	0.1	0.4	0.7	0.8	1.6	1.7	1.4	1.3	1.0	0.7	0.3	0.1	0.1						10.1
E 342.50	0.0					0.2	0.4	0.4	0.7	1.0	1.2	1.2	0.8	0.9	0.5	0.2	0.1	0.0						7.5
N 337.50					0.1	0.0	0.2	0.5	0.7	1.0	0.8	1.2	0.7	0.3	0.2	0.2	0.1	0.0						6.0
G 332.50				0.1		0.2	0.1	0.3	0.3	0.7	0.8	0.4	0.2	0.3										3.5
T 327.50				0.1	0.1	0.1	0.0	0.3	0.2	0.4	0.2	0.2	0.1	0.0		0.1								1.9
H 322.50			0.0			0.0	0.1	0.0	0.1	0.2	0.2	0.1	0.3	0.0	0.0	0.0								1.4
317.50					0.0	0.1	0.1	0.0			0.1	0.0												0.4
312.50							0.0	0.1	0.0	0.0		0.0												0.2
307.50							0.0					0.0												0.1
	0.0	0.	0.0	0.2	0.2	1.2	1.8	4.1	6.5	10.5	12.6	13.2	14.3	11.9	9.2	5.9	3.5	3.1	1.1	0.3	0.3	0.	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 2420.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-SHOULDER-ELBOW LTH	359.49	17.13	(0.257)*Y + (202.566)	15.48
Y-ACROMION H'GHT/SIT	610.53	28.54	(0.714)*X + (354.014)	25.79

***

CORRELATION COEFFICIENT 0.428 (BASED ON ORIGINAL DATA) 0.425 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.431	0.776	19+2399	-0.64
Y AS A FUNCTION OF X	0.438	1.530	22+2396	1.60

BIVARIANT DATA OF THE 1960-61 COMBINED NATO SURVEY

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND SEATED HEIGHT

SEATED HEIGHT

	774.00	784.00	794.00	804.00	814.00	824.00	834.00	844.00	854.00	864.00	874.00	884.00	894.00	904.00	914.00	924.00	934.00	944.00	954.00	964.00	974.00	984.00	994.00	TOTAL
885.00																1								1
875.00									1					1					1					3
F 865.00																	1	1	1					3
O 855.00												1					1	4	1	1		1		9
R 845.00													2	3	5	5	2	1	1	1	1		1	22
W 835.00											2	2	3	3	5	4	3	4	3	2	1		1	33
A 825.00										1	3	2	1	4	4	12	10	6	8	4		2		57
R 815.00									1	4	2	1	8	5	5	6	8	10	5	7	2	1		65
D 805.00						2		2	1	6	4	7	13	15	17	22	17	12	9	6	3			136
795.00					1		1	3	2		9	17	12	24	19	23	15	8	8	5	3			150
A 785.00						2	1	3	4	6	14	20	27	31	35	27	18	17	11	9		2	1	230
R 775.00							3	6	8	17	25	46	32	50	38	37	30	16	8		1			317
M 765.00							7	3	5	15	28	41	47	54	36	33	20	17	8	4	2	2		322
755.00						1	3	8	18	28	33	45	62	48	46	33	20	14	10	6				375
R 745.00					2	1	4	21	16	27	36	53	60	62	51	35	20	11	2	4	1	2		408
E 735.00					1	5	2	13	17	28	37	57	46	40	36	20	14	12	2	1	1			332
A 725.00				1	2	3	11	11	20	31	35	40	31	37	22	16	7	5	2	1	1			276
C 715.00			1		1	4	7	10	25	26	31	38	18	23	12	11	5	6		1				219
H 705.00					2	6	3	11	16	23	20	22	19	13	8	11	2		2					158
695.00	1		1		3	3	2	10	9	18	15	19	10	8	8	4	1	1						113
685.00				1		4	1	4	12	9	7	8	3	3										52
675.00					1	1	1	1	6	4	5	5	3	2										29
665.00			1		1	1	2	1	1	1	1	2	1		2									14
	1	0	3	2	14	33	48	107	162	246	307	426	398	426	349	300	194	145	82	52	16	10	3	3324

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	754.76	35.11	(0.497)*Y + (308.116)	31.53
Y-SITTING HEIGHT	898.78	31.07	(0.389)*X + (605.044)	27.90

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CORRELATION COEFFICIENT 0.440 (BASED ON ORIGINAL DATA) 0.438 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.443	0.972	20+3302	0.01
Y AS A FUNCTION OF X	0.444	1.066	21+3301	0.31

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND SEATED HEIGHT

SEATED HEIGHT

		774.0C	784.00	794.0C	804.0C	814.0C	824.0C	834.00	844.00	854.00	864.00	874.00	884.00	894.00	904.0C	914.00	924.00	934.00	944.00	954.00	964.00	974.00	984.00	994.00	TOTAL
	885.C0																0.0								0.C
F	875.C0									0.0					0.0					0.C					0.1
O	865.C0																	0.0	0.0	0.0					0.1
R	855.C0												0.0					0.0	0.1	0.0	0.0		0.0		0.3
W	845.00													0.1	0.1	0.2	0.2	0.1	0.0	0.0	0.0	0.0		0.0	0.7
A	835.C0											0.1	0.1	C.1	0.1	0.2	0.1	0.1	0.1	C.1	0.1	0.0		0.0	1.0
R	825.CC										0.0	0.1	C.1	0.0	0.1	0.1	0.4	0.3	0.2	0.2	C.1		0.1		1.7
D	815.C0									0.0	C.1	0.1	0.C	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.1	C.0		2.0
	805.C0						0.1		0.1	C.0	0.2	C.1	0.2	0.4	C.5	0.5	0.7	0.5	C.4	0.3	0.2	0.1			4.1
A	795.00					0.C		0.0	C.1	0.1		C.3	C.5	0.4	0.7	0.6	0.7	0.5	C.2	0.2	C.2	0.1			4.5
R	785.00						0.1	0.0	0.1	0.1	0.2	C.4	0.6	C.8	0.9	1.1	0.8	0.5	0.5	C.3	0.3		0.1	0.0	6.9
M	775.C0							0.1	0.2	0.2	0.5	C.8	1.4	1.C	1.5	1.1	1.1	0.9	0.5	0.2		0.0			9.5
	765.C0							0.2	0.1	0.2	0.5	C.8	1.2	1.4	1.6	1.1	1.0	0.6	0.5	0.2	C.1	0.1	0.1		9.7
R	755.C0						0.0	0.1	0.2	0.5	0.8	1.0	1.4	1.9	1.4	1.4	1.0	0.6	C.4	0.3	0.2				11.3
E	745.C0					0.1	0.0	0.1	C.6	0.5	0.8	1.1	1.6	1.8	1.9	1.5	1.1	0.6	C.3	0.1	C.1	0.0	0.1		12.3
A	735.C0					C.C	0.2	0.1	0.4	0.5	0.8	1.1	1.7	1.4	1.2	1.1	0.6	0.4	0.4	0.1	0.0	0.0			10.C
C	725.00				C.C	0.1	0.1	0.3	C.3	C.6	0.9	1.1	1.2	C.9	1.1	0.7	0.5	0.2	C.2	0.1	0.0	0.0			8.3
H	715.00			0.0		0.0	C.1	0.2	0.3	0.8	C.8	0.9	1.1	0.5	0.7	0.4	0.3	0.2	0.2		0.0				6.6
	705.00					C.1	C.2	0.1	0.3	0.5	0.7	C.6	C.7	0.6	0.4	0.2	0.3	0.1		0.1					4.8
	695.C0	0.C		C.0		0.1	C.1	0.1	0.3	0.3	0.5	C.5	C.6	0.3	0.2	0.2	0.1	0.0	0.0						3.4
	685.CC				0.0		0.1	0.0	0.1	0.4	0.3	C.2	C.2	C.1	C.1										1.6
	675.00					0.0	C.0	0.0	0.0	0.2	0.1	C.2	C.2	C.1	0.1										0.9
	665.CC			0.C		0.0	0.0	0.1	0.C	0.0	0.C	C.C	0.1	0.0		0.1									0.4
		0.0	0.	0.1	0.1	0.4	1.0	1.4	3.2	4.9	7.4	9.2	12.8	12.0	12.8	10.5	9.C	5.8	4.4	2.5	1.6	0.5	0.3	C.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 3324.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	754.76	35.11	(0.497)*Y + (308.116)	31.53
Y-SITTING HEIGHT	898.78	31.07	(0.389)*X + (605.044)	27.90

***

CORRELATION COEFFICIENT 0.440 (BASED ON ORIGINAL DATA) 0.438 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.443	0.972	20+3302	0.01
Y AS A FUNCTION OF X	0.444	1.066	21+3301	0.31

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND STATURE

STATURE

	1489.00	1509.00	1529.00	1549.00	1569.00	1589.00	1609.00	1629.00	1649.00	1669.00	1689.00	1709.00	1729.00	1749.00	1769.00	1789.00	1809.00	1829.00	1849.00	1869.00	1889.00	1909.00	TOTAL
885.00																				1			1
875.00													1	1							1		3
F 865.00																	1	1		1			3
O 855.00															1	2	1	2	1	2			9
R 845.00													1	4	1	2	7	2	2	1	1	1	22
W 835.00											1		4	4	3	7	2	5	3	3	1		33
A 825.00											1	1	1	6	9	15	11	10	2		1		57
R 815.00								1		2	3	1	5	8	11	11	13	4	4	2			65
D 805.00									1	5	6	9	17	19	33	19	17	5	3	1		1	136
795.00						1		1	3	6	6	17	22	34	22	20	8	5	4	1			150
A 785.00						1	2	5	4	6	24	34	39	38	37	21	12	5	2				230
R 775.00						1	3	9	10	15	45	61	59	64	23	19	5	1	2				317
M 765.00							6	7	16	26	51	57	70	43	27	15	3	1					322
755.00					1	2	5	13	37	53	67	52	64	43	21	8	7	1		1			375
R 745.00						4	10	24	43	78	68	76	58	28	11	5	3						408
E 735.00				1	1	6	18	23	51	60	64	46	35	18	6		3						332
A 725.00					3	12	19	39	47	56	38	33	16	9	3		1						276
C 715.00					10	13	24	42	36	35	29	14	8	4	3	1							219
H 705.00		1		2	5	10	28	26	34	29	12	8	2	1									158
695.00	1		2		5	18	20	29	10	16	10	1	1										113
685.00			1	3	5	11	13	6	5	6	2												52
675.00		1		1	3	7	7	6	2	1	1												29
665.00		1		2	4	1	2	1	1	1	1												14
	1	3	3	9	37	87	157	232	300	395	429	410	403	324	211	145	94	42	23	13	4	2	3324

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	754.76	35.11	(0.415)*Y + (48.908)	24.82
Y-HEIGHT (STATURE)	1702.18	59.87	(1.206)*X + (791.998)	42.33

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CORRELATION COEFFICIENT 0.707 (BASED ON ORIGINAL DATA) 0.705 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.707	0.905	20+3302	-0.21
Y AS A FUNCTION OF X	0.706	0.696	21+3301	-1.00

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND STATURE

STATURE

		1489.00	1509.00	1529.00	1549.00	1569.00	1589.00	1609.00	1629.00	1649.00	1669.00	1689.00	1709.00	1729.00	1749.00	1769.00	1789.00	1809.00	1829.00	1849.00	1869.00	1889.00	1909.00	TOTAL
	885.00																				0.0			0.0
F	875.00													0.0	0.0							0.0		0.1
O	865.00																	0.0	0.0		0.0			0.1
R	855.00															0.0	0.1	0.0	0.1	0.0	0.1			0.3
W	845.00													0.0	0.1	0.0	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.7
A	835.00											0.0		0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.0		1.0
R	825.00											0.0	0.0	0.0	0.2	0.3	0.5	0.3	0.3	0.1		0.0		1.7
D	815.00								0.0		0.1	0.1	0.0	0.2	0.2	0.3	0.3	0.4	0.1	0.1	0.1			2.0
	805.00									0.0	0.2	0.2	0.3	0.5	0.6	1.0	0.6	0.5	0.2	0.1	0.0		0.0	4.1
A	795.00						0.0		0.0	0.1	0.2	0.2	0.5	0.7	1.0	0.7	0.6	0.2	0.2	0.1	0.0			4.5
R	785.00						0.0	0.1	0.2	0.1	0.2	0.7	1.0	1.2	1.1	1.1	0.6	0.4	0.2	0.1				6.9
M	775.00						0.0	0.1	0.3	0.3	0.5	1.4	1.8	1.8	1.9	0.7	0.6	0.2	0.0	0.1				9.5
	765.00							0.2	0.2	0.5	0.8	1.5	1.7	2.1	1.3	0.8	0.5	0.1	0.0					9.7
R	755.00					0.0	0.1	0.2	0.4	1.1	1.6	2.0	1.6	1.9	1.3	0.6	0.2	0.2	0.0		0.0			11.3
E	745.00						0.1	0.3	0.7	1.3	2.3	2.0	2.3	1.7	0.8	0.3	0.2	0.1						12.3
A	735.00				0.0	0.0	0.2	0.5	0.7	1.5	1.8	1.9	1.4	1.1	0.5	0.2		0.1						10.0
C	725.00					0.1	0.4	0.6	1.2	1.4	1.7	1.1	1.0	0.5	0.3	0.1		0.0						8.3
H	715.00					0.3	0.4	0.7	1.3	1.1	1.1	0.9	0.4	0.2	0.1	0.1	0.0							6.6
	705.00		0.0		0.1	0.2	0.3	0.8	0.8	1.0	0.9	0.4	0.2	0.1	0.0									4.8
	695.00	0.0		0.1		0.2	0.5	0.6	0.9	0.3	0.5	0.3	0.0	0.0										3.4
	685.00			0.0	0.1	0.2	0.3	0.4	0.2	0.2	0.2	0.1												1.6
	675.00		0.0		0.0	0.1	0.2	0.2	0.2	0.1	0.0	0.0												0.9
	665.00		0.0		0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0												0.4
		0.0	0.1	0.1	0.3	1.1	2.6	4.7	7.0	9.0	11.9	12.9	12.3	12.1	9.7	6.3	4.4	2.8	1.3	0.7	0.4	0.1	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 3324.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	754.76	35.11	(0.415)*Y + (48.908)	24.82
Y-HEIGHT (STATURE)	1702.18	59.87	(1.206)*X + (791.998)	42.33

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CORRELATION COEFFICIENT 0.707 (BASED ON ORIGINAL DATA) 0.705 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.707	0.905	20+3302	-0.21
Y AS A FUNCTION OF X	0.706	0.696	21+3301	-1.00

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND SEATED SHOULDER HEIGHT

SEATED SHOULDER HEIGHT

FORWARD ARM REACH	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	644.00	654.00	664.00	674.00	684.00	694.00	TOTAL
885.00											1							1
875.00									1		1		1					3
865.00											2	1						3
855.00							1				3	2	1		1	1		9
845.00						1			3	5	5	2	3		2		1	22
835.00						1	2	4	3	4	6	2	6	2	3			33
825.00					1	1	1	3	5	8	10	9	11	6	1	1		57
815.00					1	2	3	3	14	7	9	9	4	9	3	1		65
805.00			1	1	4	3	6	11	23	26	22	17	10	9	2	1		136
795.00			1	1		5	19	15	16	25	25	21	9	9	4			150
785.00			1	3	4	14	18	22	38	37	31	34	12	7	6	3		230
775.00				9	9	25	27	47	57	47	40	29	20	5	2			317
765.00			1	5	9	16	50	42	58	49	42	21	17	5	5	2		322
755.00			1	7	24	23	39	52	76	58	42	34	13	1	4	1		375
745.00		2	7	3	23	32	56	72	70	73	32	20	7	9	1		1	408
735.00		2	5	12	16	38	52	70	42	39	28	12	7	6	2	1		332
725.00		1	4	12	26	31	50	54	34	34	14	9	3	4				276
715.00	1	1	7	13	29	31	30	32	29	23	14	4	4	1				219
705.00		2	5	8	8	37	29	29	13	11	6	7	3					158
695.00	1	2	4	12	8	15	19	24	13	9	5	1						113
685.00		1	1	6	10	13	5	10	3	2	1							52
675.00		1	1	5		11	3	4	1	3								29
665.00	2		2		2	2	1	4		1								14
	4	12	41	97	174	301	411	498	499	461	339	234	131	73	36	11	2	3324

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	754.76	35.11	(0.582)*Y + (397.536)	31.78
Y-MID-SH'LDER HT/SIT	613.50	25.63	(0.310)*X + (379.338)	23.20

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CORRELATION COEFFICIENT 0.425 (BASED ON ORIGINAL DATA) 0.424 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.432	1.761	15+3307	1.82
Y AS A FUNCTION OF X	0.428	0.693	21+3301	-1.01

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND SEATED SHOULDER HEIGHT

SEATED SHOULDER HEIGHT

		534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	644.00	654.00	664.00	674.00	684.00	694.00	TOTAL
	885.00											0.0							0.0
F	875.00									0.0		0.0		0.0					0.1
O	865.00											0.1	0.0						0.1
R	855.00							0.0				0.1	0.1	0.0		0.0	0.0		0.3
W	845.00						0.0			0.1	0.2	0.2	0.1	0.1		0.1		0.0	0.7
A	835.00						0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.1			1.0
R	825.00					0.0	0.0	0.0	0.1	0.2	0.2	0.3	0.3	0.3	0.2	0.0	0.0		1.7
D	815.00					0.0	0.1	0.1	0.1	0.4	0.2	0.3	0.3	0.1	0.3	0.1	0.0		2.0
	805.00			0.0	0.0	0.1	0.1	0.2	0.3	0.7	0.8	0.7	0.5	0.3	0.3	0.1	0.0		4.1
A	795.00			0.0	0.0		0.2	0.6	0.5	0.5	0.3	0.8	0.6	0.3	0.3	0.1			4.5
R	785.00			0.0	0.1	0.1	0.4	0.5	0.7	1.1	1.1	0.9	1.0	0.4	0.2	0.2	0.1		6.9
M	775.00				0.3	0.3	0.8	0.8	1.4	1.7	1.4	1.2	0.9	0.6	0.2	0.1			9.5
	765.00			0.0	0.2	0.3	0.5	1.5	1.3	1.7	1.5	1.3	0.6	0.5	0.2	0.2	0.1		9.7
R	755.00			0.0	0.2	0.7	0.7	1.2	1.6	2.3	1.7	1.3	1.0	0.4	0.0	0.1	0.0		11.3
E	745.00		0.1	0.2	0.1	0.7	1.0	1.7	2.2	2.1	2.2	1.0	0.6	0.2	0.3	0.0		0.0	12.3
A	735.00		0.1	0.2	0.4	0.5	1.1	1.6	2.1	1.3	1.2	0.8	0.4	0.2	0.2	0.1	0.0		10.0
C	725.00		0.0	0.1	0.4	0.8	0.9	1.5	1.6	1.0	1.0	0.4	0.3	0.1	0.1				8.3
H	715.00	0.0	0.0	0.2	0.4	0.9	0.9	0.9	1.0	0.9	0.7	0.4	0.1	0.1	0.0				6.6
	705.00		0.1	0.2	0.2	0.2	1.1	0.9	0.9	0.4	0.3	0.2	0.2	0.1					4.8
	695.00	0.0	0.1	0.1	0.4	0.2	0.5	0.6	0.7	0.4	0.3	0.2	0.0						3.4
	685.00		0.0	0.0	0.2	0.3	0.4	0.2	0.3	0.1	0.1	0.0							1.6
	675.00		0.0	0.0	0.2		0.3	0.1	0.1	0.0	0.1								0.9
	665.00	0.1		0.1		0.1	0.1	0.0	0.1		0.0								0.4
		0.1	0.4	1.2	2.9	5.2	9.1	12.4	15.0	15.0	13.9	10.2	7.0	3.9	2.2	1.1	0.3	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 3324.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	754.76	35.11	(0.582)*Y + (397.536)	31.78
Y-MID-SH'LDER HT/SIT	613.50	25.63	(0.310)*X + (379.338)	23.20

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CORRELATION COEFFICIENT 0.425 (BASED ON ORIGINAL DATA) 0.424 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.432	1.761	15+3307	1.82
Y AS A FUNCTION OF X	0.428	0.693	21+3301	-1.01

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND BUTTOCK-KNEE LENGTH

BUTTOCK-KNEE LENGTH

		504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	644.00	654.00	664.00	TOTAL
	885.00																	1	1
	875.00										1			1			1		3
F	865.00												1	1	1				3
O	855.00								1			1	2	2	1	2			9
R	845.00									1	2	3	3	6	3	3		1	22
W	835.00							1		1	9	4	4	3	7	2		2	33
A	825.00								2	4	11	15	7	10	5	3			57
R	815.00						1	2	4	9	9	16	10	9	2	1		2	65
D	805.00						1	8	7	23	27	26	19	15	4	6			136
	795.00				1	3	2	15	12	24	33	26	13	12	8	1			150
A	785.00				1	8	8	17	23	51	52	33	19	10	5	2	1		230
R	775.00				2	4	19	43	55	68	57	38	21	8	1		1		317
M	765.00			1	1	14	22	40	70	71	60	25	12	5	1				322
	755.00				7	17	42	79	72	76	37	26	12	7					375
R	745.00				7	34	50	94	106	65	31	13	5	3					408
E	735.00		2	2	20	36	65	73	56	45	19	11	2	1					332
A	725.00	1	3	4	23	44	70	54	39	22	7	7	2						276
C	715.00	1	2	12	30	38	40	47	31	8	8	2							219
H	705.00		7	12	25	36	32	23	13	8	1	1							158
	695.00	1	5	10	22	34	24	6	5	4	1	1							113
	685.00	1	3	12	7	9	10	7	3										52
	675.00	1	4	2	9	5	7	1											29
	665.00		1	6	4			1		1	1								14
		5	27	61	159	282	393	511	499	481	366	248	132	93	38	20	3	6	3324

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	754.76	35.11	(0.936)*Y + (215.249)	25.89
Y-BUTTOCK-KNEE L'GTH	576.19	25.33	(0.487)*X + (208.376)	18.67

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CORRELATION COEFFICIENT 0.676 (BASED ON ORIGINAL DATA) 0.680 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.682	1.103	15+3307	0.39
Y AS A FUNCTION OF X	0.681	0.441	21+3301	-2.21

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND BUTTOCK-KNEE LENGTH

BUTTOCK-KNEE LENGTH

		504 .00	514 .00	524 .00	534 .00	544 .00	554 .00	564 .00	574 .00	584 .00	594 .00	604 .00	614 .00	624 .00	634 .00	644 .00	654 .00	664 .00	TOTAL
	885.00																	0.0	0.0
F	875.00										0.0			0.0			0.0		0.1
O	865.00												0.0	0.0	0.0				0.1
R	855.00								0.0			0.0	0.1	0.1	0.0	0.1			0.3
W	845.00									0.0	0.1	0.1	0.1	0.2	0.1	0.1		0.0	0.7
A	835.00							0.0		0.0	0.3	0.1	0.1	0.1	0.2	0.1		0.1	1.0
R	825.00								0.1	0.1	0.3	0.5	0.2	0.3	0.2	0.1			1.7
D	815.00						0.0	0.1	0.1	0.3	0.3	0.5	0.3	0.3	0.1	0.0		0.1	2.0
	805.00						0.0	0.2	0.2	0.7	0.8	0.8	0.6	0.5	0.1	0.2			4.1
A	795.00				0.0	0.1	0.1	0.5	0.4	0.7	1.0	0.8	0.4	0.4	0.2	0.0			4.5
R	785.00				0.0	0.2	0.2	0.5	0.7	1.5	1.6	1.0	0.6	0.3	0.2	0.1	0.0		6.9
M	775.00				0.1	0.1	0.6	1.3	1.7	2.0	1.7	1.1	0.6	0.2	0.0		0.0		9.5
	765.00			0.0	0.0	0.4	0.7	1.2	2.1	2.1	1.8	0.8	0.4	0.2	0.0				9.7
R	755.00				0.2	0.5	1.3	2.4	2.2	2.3	1.1	0.8	0.4	0.2					11.3
E	745.00				0.2	1.0	1.5	2.8	3.2	2.0	0.9	0.4	0.2	0.1					12.3
A	735.00		0.1	0.1	0.6	1.1	2.0	2.2	1.7	1.4	0.6	0.3	0.1	0.0					10.0
C	725.00	0.0	0.1	0.1	0.7	1.3	2.1	1.6	1.2	0.7	0.2	0.2	0.1						8.3
H	715.00	0.0	0.1	0.4	0.9	1.1	1.2	1.4	0.9	0.2	0.2	0.1							6.6
	705.00		0.2	0.4	0.8	1.1	1.0	0.7	0.4	0.2	0.0	0.0							4.8
	695.00	0.0	0.2	0.3	0.7	1.0	0.7	0.2	0.2	0.1	0.0	0.0							3.4
	685.00	0.0	0.1	0.4	0.2	0.3	0.3	0.2	0.1										1.6
	675.00	0.0	0.1	0.1	0.3	0.2	0.2	0.0											0.9
	665.00		0.0	0.2	0.1			0.0		0.0	0.0								0.4
		0.2	0.8	1.8	4.8	8.5	11.8	15.4	15.0	14.5	11.0	7.5	4.0	2.8	1.1	0.6	0.1	0.2	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 3324.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	754.76	35.11	(0.936)*Y + (215.249)	25.89
Y-BUTTOCK-KNEE L'GTH	576.19	25.33	(0.487)*X + (208.376)	18.67

***

CORRELATION COEFFICIENT 0.676 (BASED ON ORIGINAL DATA) 0.680 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.682	1.103	15+3307	0.39
Y AS A FUNCTION OF X	0.681	0.441	21+3301	-2.21

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND SEATED EYE HEIGHT

SEATED EYE HEIGHT

		674.00	684.00	694.00	704.00	714.00	724.00	734.00	744.00	754.00	764.00	774.00	784.00	794.00	804.00	814.00	824.00	834.00	844.00	854.00	864.00	874.00	884.00	894.00	TOTAL
	885.00														1										1
	875.00						1							1			1								3
F	865.00													1		2									3
O	855.00								1						1	4	2			1					9
R	845.00										1	2		5	6	4			2	1				1	22
W	835.00								1	1	1	4	5	3	4	6	3	3	1		1				33
A	825.00					1			1	2	2	5	2	5	12	6	8	5	6	2					57
R	815.00							2	1	3	6	3	9	5	8	11	8	3	4		2				65
D	805.00					2	1	3	4	7	7	9	16	20	24	18	15	6	3	1					136
	795.00		1				1	2	5	5	20	13	25	16	28	17	6	6	3	1	1				150
A	785.00				1		4	3	7	18	21	34	29	36	20	21	18	11	4	2	1				230
R	775.00					4	6	9	18	26	31	43	47	48	36	25	10	9	4	1					317
M	765.00					3	7	12	17	25	34	47	55	43	29	16	16	12	3	3					322
	755.00				3	1	4	5	31	41	54	56	48	49	31	27	13	7	4	1					375
R	745.00			2	1	2	15	19	34	35	51	58	74	47	33	15	11	5	3	2	1				408
E	735.00			2	4	2	14	13	24	35	58	56	43	35	18	12	8	5	3						332
A	725.00			1	1	4	15	20	28	42	43	32	32	28	18	3	5	3	1						276
C	715.00	1			1	9	7	23	26	39	27	25	19	18	11	7	4	1		1					219
H	705.00			1	2	7	11	10	19	25	25	17	14	11	7	5	2	1		1					158
	695.00	1	1	1	3	3	11	7	19	13	13	12	13	12	3	1									113
	685.00				1	1	5	11	8	6	6	8	3		3										52
	675.00		1			3		4	2	5	6	2	4	2											29
	665.00				3	1		2	1		1	2		4											14
		2	3	7	20	43	102	145	247	328	407	428	438	389	293	200	130	77	41	17	6	0	0	1	3324

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	754.76	35.11	(0.469)*Y + (389.747)	32.22
Y-EYE HT/SITTING	778.89	29.74	(0.336)*X + (525.088)	27.29

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CORRELATION COEFFICIENT 0.397 (BASED ON ORIGINAL DATA) 0.396 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.404	1.281	19+3303	0.90
Y AS A FUNCTION OF X	0.401	0.717	21+3301	-0.92

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND SEATED EYE HEIGHT

SEATED EYE HEIGHT

	674.00	684.00	694.00	704.00	714.00	724.00	734.00	744.00	754.00	764.00	774.00	784.00	794.00	804.00	814.00	824.00	834.00	844.00	854.00	864.00	874.00	884.00	894.00	TOTAL
885.00														0.0										0.0
F 875.00						0.0							0.0			0.0								0.1
O 865.00													0.0		0.1									0.1
R 855.00								0.0						0.0	0.1	0.1			0.0					0.3
W 845.00										0.0	0.1		0.2	0.2	0.1			0.1	0.0				0.0	0.7
A 835.00								0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.0		0.0				1.0
R 825.00					0.0			0.0	0.1	0.1	0.2	0.1	0.2	0.4	0.2	0.2	0.2	0.2	0.1					1.7
D 815.00							0.1	0.0	0.1	0.2	0.1	0.3	0.2	0.2	0.3	0.2	0.1	0.1		0.1				2.0
805.00					0.1	0.0	0.1	0.1	0.2	0.2	0.3	0.5	0.6	0.7	0.5	0.5	0.2	0.1	0.0					4.1
A 795.00		0.0				0.0	0.1	0.2	0.2	0.6	0.4	0.8	0.5	0.8	0.5	0.2	0.2	0.1	0.0	0.0				4.5
R 785.00				0.0		0.1	0.1	0.2	0.5	0.6	1.0	0.9	1.1	0.6	0.6	0.5	0.3	0.1	0.1	0.0				6.9
M 775.00					0.1	0.2	0.3	0.5	0.8	0.9	1.3	1.4	1.4	1.1	0.8	0.3	0.3	0.1	0.0					9.5
765.00					0.1	0.2	0.4	0.5	0.8	1.0	1.4	1.7	1.3	0.9	0.5	0.5	0.4	0.1	0.1					9.7
R 755.00				0.1	0.0	0.1	0.2	0.9	1.2	1.6	1.7	1.4	1.5	0.9	0.8	0.4	0.2	0.1	0.0					11.3
E 745.00			0.1	0.0	0.1	0.5	0.6	1.0	1.1	1.5	1.7	2.2	1.4	1.0	0.5	0.3	0.2	0.1	0.1	0.0				12.3
A 735.00			0.1	0.1	0.1	0.4	0.4	0.7	1.1	1.7	1.7	1.3	1.1	0.5	0.4	0.2	0.2	0.1						10.0
C 725.00			0.0	0.0	0.1	0.5	0.6	0.8	1.3	1.3	1.0	1.0	0.8	0.5	0.1	0.2	0.1	0.0						8.3
H 715.00	0.0			0.0	0.3	0.2	0.7	0.8	1.2	0.8	0.8	0.6	0.5	0.3	0.2	0.1	0.0		0.0					6.6
705.00			0.0	0.1	0.2	0.3	0.3	0.6	0.8	0.8	0.5	0.4	0.3	0.2	0.2	0.1	0.0		0.0					4.8
695.00	0.0	0.0	0.0	0.1	0.1	0.3	0.2	0.6	0.4	0.4	0.4	0.4	0.4	0.1	0.0									3.4
685.00				0.0	0.0	0.2	0.3	0.2	0.2	0.2	0.2	0.1		0.1										1.6
675.00		0.0			0.1		0.1	0.1	0.2	0.2	0.1	0.1	0.1											0.9
665.00				0.1	0.0		0.1	0.0		0.0	0.1		0.1											0.4
	0.1	0.1	0.2	0.6	1.3	3.1	4.4	7.4	9.9	12.2	12.9	13.2	11.7	8.8	6.0	3.9	2.3	1.2	0.5	0.2	0.	0.	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 3324.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	754.76	35.11	(0.469)*Y + (389.747)	32.22
Y-EYE HT/SITTING	778.89	29.74	(0.336)*X + (525.088)	27.29

***

CORRELATION COEFFICIENT 0.397 (BASED ON ORIGINAL DATA) 0.396 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.404	1.281	19+ 303	0.90
Y AS A FUNCTION OF X	0.401	0.717	21+ 01	-0.92

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND SEATED SHOULDER BREADTH

SEATED SHOULDER BREADTH

FORWARD ARM REACH	374.00	384.00	394.00	404.00	414.00	424.00	434.00	444.00	454.00	464.00	474.00	484.00	494.00	504.00	514.00	524.00	534.00	TOTAL
885.00											1							1
875.00					1		1									1		3
865.00						1	1				1							3
855.00				1				1	1		1	3	2					9
845.00					1		2	3	3	2		6	3	1		1		22
835.00						1	3	4	8	6	5		4	1		1		33
825.00							7	8	9	8	10	6	3	5	1			57
815.00					1	3	2	11	10	17	5	5	7	2	1	1		65
805.00					2	10	9	15	21	26	26	12	7	6		1	1	136
795.00			1	3	8	6	13	24	20	26	22	10	8	6	3			150
785.00			1	1	9	12	21	32	40	40	31	20	13	7	2		1	230
775.00		1		3	11	21	33	54	67	49	33	22	14	5	1	1	2	317
765.00			4	3	12	25	38	49	55	60	36	24	11	4	1			322
755.00			2	1	15	25	59	71	58	59	44	22	12	5	1		1	375
745.00			5	9	21	23	50	67	79	70	42	22	11	7	2			408
735.00				3	21	37	53	60	54	43	23	17	13	6	1	1		332
725.00		2	2	4	25	23	48	50	41	43	14	15	7	2				276
715.00		1	2	11	16	20	33	38	37	29	18	8	3	2	1			219
705.00			2	7	12	28	25	31	12	16	12	7	2	2	2			158
695.00	1			4	12	16	22	18	13	16	3	5	1	1	1			113
685.00			2	3	4	8	10	8	11	2	2	2						52
675.00			1		1	1	4	11	7	3			1					29
665.00					1	2	4	3		1	2	1						14
	1	4	22	53	173	262	438	558	546	516	331	207	122	62	17	7	5	3324

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	754.76	35.11	(0.379)*Y + (582.726)	33.98
Y-BIDELTOID(SHLDR)BR	454.14	23.26	(0.166)*X + (328.591)	22.52

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CORRELATION COEFFICIENT 0.251 (BASED ON ORIGINAL DATA) 0.252 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.261	1.049	15+3307	0.25
Y AS A FUNCTION OF X	0.261	0.734	21+3301	-0.85

BIVARIATE FREQUENCY TABLE FOR
FORWARD ARM REACH AND SEATED SHOULDER BREADTH

SEATED SHOULDER BREADTH

		374 .00	384 .00	394 .00	404 .00	414 .00	424 .00	434 .00	444 .00	454 .00	464 .00	474 .00	484 .00	494 .00	504 .00	514 .00	524 .00	534 .00	TOTAL
	885.00											0.0							0.0
F	875.00					0.0		0.0									0.0		0.1
O	865.00						0.0	0.0				0.0							0.1
R	855.00				0.0				0.0	0.0		0.0	0.1	0.1					0.3
W	845.00					0.0		0.1	0.1	0.1	0.1		0.2	0.1	0.0		0.0		0.7
A	835.00						0.0	0.1	0.1	0.2	0.2	0.2		0.1	0.0		0.0		1.0
R	825.00							0.2	0.2	0.3	0.2	0.3	0.2	0.1	0.2	0.0			1.7
D	815.00					0.0	0.1	0.1	0.3	0.3	0.5	0.2	0.2	0.2	0.1	0.0	0.0		2.0
	805.00					0.1	0.3	0.3	0.5	0.6	0.8	0.8	0.4	0.2	0.2		0.0	0.0	4.1
A	795.00			0.0	0.1	0.2	0.2	0.4	0.7	0.6	0.8	0.7	0.3	0.2	0.2	0.1			4.5
R	765.00			0.0	0.0	0.3	0.4	0.6	1.0	1.2	1.2	0.9	0.6	0.4	0.2	0.1		0.0	6.9
M	775.00		0.0		0.1	0.3	0.6	1.0	1.6	2.0	1.5	1.0	0.7	0.4	0.2	0.0	0.0	0.1	9.5
	765.00			0.1	0.1	0.4	0.8	1.1	1.5	1.7	1.8	1.1	0.7	0.3	0.1	0.0			9.7
R	755.00			0.1	0.0	0.5	0.8	1.8	2.1	1.7	1.8	1.3	0.7	0.4	0.2	0.0		0.0	11.3
E	745.00			0.2	0.3	0.6	0.7	1.5	2.0	2.4	2.1	1.3	0.7	0.3	0.2	0.1			12.3
A	735.00				0.1	0.6	1.1	1.6	1.8	1.6	1.3	0.7	0.5	0.4	0.2	0.0	0.0		10.0
C	725.00		0.1	0.1	0.1	0.8	0.7	1.4	1.5	1.2	1.3	0.4	0.5	0.2	0.1				8.3
H	715.00		0.0	0.1	0.3	0.5	0.6	1.0	1.1	1.1	0.9	0.5	0.2	0.1	0.1	0.0			6.6
	705.00			0.1	0.2	0.4	0.8	0.8	0.9	0.4	0.5	0.4	0.2	0.1	0.1	0.1			4.8
	695.00	0.0			0.1	0.4	0.5	0.7	0.5	0.4	0.5	0.1	0.2	0.0	0.0	0.0			3.4
	685.00			0.1	0.1	0.1	0.2	0.3	0.2	0.3	0.1	0.1	0.1						1.6
	675.00			0.0		0.0	0.0	0.1	0.3	0.2	0.1			0.0					0.9
	665.00					0.0	0.1	0.1	0.1		0.0	0.1	0.0						0.4
		0.0	0.1	0.7	1.6	5.2	7.9	13.2	16.8	16.4	15.5	10.0	6.2	3.7	1.9	0.5	0.2	0.2	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 3324.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-FUNCTIONAL REACH	754.76	35.11	(0.379)*Y + (582.726)	33.98
Y-BIDELTOID(SHLDR)BR	454.14	23.26	(0.166)*X + (328.591)	22.52

***

CORRELATION COEFFICIENT 0.251 (BASED ON ORIGINAL DATA) 0.252 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.261	1.049	15+3307	0.25
Y AS A FUNCTION OF X	0.261	0.734	21+3301	-0.85

BIVARIATE FREQUENCY TABLE FOR
BUTTOCK-KNEE LNTH AND SEATED SHOULDER HEIGHT

SEATED SHOULDER HEIGHT

	534 .00	544 .00	554 .00	564 .00	574 .00	584 .00	594 .00	604 .00	614 .00	624 .00	634 .00	644 .00	654 .00	664 .00	674 .00	684 .00	694 .00	TOTAL
B 665.00									2	1	1		1	1				6
U 655.00									2				1					3
T 645.00										1	4	4	6		3	1	1	20
T 635.00						3	1		5	6	8	4	3	8				38
O 625.00				2		1	4	5	7	19	19	16	7	6	5	2		93
C 615.00					1	4	8	13	17	20	28	14	13	11	3			132
K 605.00				1	8	11	22	19	50	31	32	33	21	7	11	2		248
- 595.00				2	5	20	34	47	57	70	51	39	20	11	9	1		366
K 585.00				3	14	35	52	73	77	82	62	42	24	13	1	3		481
N 575.00	1	1	6	7	21	39	67	90	89	74	48	29	16	7	3	1		499
E 565.00		2	5	21	33	42	76	93	82	69	48	24	7	7	1		1	511
E 555.00		1	7	23	36	50	57	65	64	49	19	15	6	1				393
545.00	1	3	10	14	30	44	46	51	34	24	7	10	6	1		1		282
L 535.00		2	6	14	19	39	26	23	9	10	8	3						159
N 525.00	2	3	6	5	6	8	9	11	3	4	3	1						61
T 515.00			1	5		5	6	7	1	1	1							27
H 505.00					1		3	1										5
	4	12	41	97.	174	301	411	498	499	461	339	234	131	73	36	11	2	3324

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BUTTOCK-KNEE L'GTH	576.19	25.33	(0.439)*Y + (307.122)	22.70
Y-MID-SH'LDER HT/SIT	613.50	25.63	(0.449)*X + (354.792)	22.96

***

CORRELATION COEFFICIENT 0.444 (BASED ON ORIGINAL DATA) 0.444 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.448	0.916	15+3307	-0.11
Y AS A FUNCTION OF X	0.449	1.292	15+3307	0.85

BIVARIATE FREQUENCY TABLE FOR
BUTTOCK-KNEE LNTH AND SEATED SHOULDER HEIGHT

SEATED SHOULDER HEIGHT

	534 .00	544 .00	554 .00	564 .00	574 .00	584 .00	594 .00	604 .00	614 .00	624 .00	634 .00	644 .00	654 .00	664 .00	674 .00	684 .00	694 .00	TOTAL
B 665.00									0.1	0.0	0.0		0.0	0.0				0.2
U 655.0C									0.1				0.0					0.1
T 645.00										0.0	0.1	0.1	0.2		0.1	0.0	0.0	0.6
T 635.00						0.1	0.0		0.2	0.2	0.2	0.1	0.1	0.2				1.1
O 625.00				0.1		0.0	0.1	0.2	0.2	0.6	0.6	0.5	0.2	0.2	0.2	0.1		2.8
C 615.00					0.0	0.1	0.2	0.4	0.5	0.6	0.8	0.4	0.4	0.3	0.1			4.0
K 605.00				0.0	0.2	0.3	0.7	0.6	1.5	0.9	1.0	1.0	0.6	0.2	0.3	0.1		7.5
- 595.00				0.1	0.2	0.6	1.0	1.4	1.7	2.1	1.5	1.2	0.6	0.3	0.3	0.0		11.0
K 585.00				0.1	0.4	1.1	1.6	2.2	2.3	2.5	1.9	1.3	0.7	0.4	0.0	0.1		14.5
N 575.00	0.0	0.0	0.2	0.2	0.6	1.2	2.0	2.7	2.7	2.2	1.4	0.9	0.5	0.2	0.1	0.0		15.0
E 565.00		0.1	0.2	0.6	1.0	1.3	2.3	2.8	2.5	2.1	1.4	0.7	0.2	0.2	0.0		0.0	15.4
E 555.00		0.0	0.2	0.7	1.1	1.5	1.7	2.0	1.9	1.5	0.6	0.5	0.2	0.0				11.8
545.00	0.0	0.1	0.3	0.4	0.9	1.3	1.4	1.5	1.0	0.7	0.2	0.3	0.2	0.0		0.0		8.5
L 535.00		0.1	0.2	0.4	0.6	1.2	0.8	0.7	0.3	0.3	0.2	0.1						4.8
N 525.00	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.1	0.1	0.1	0.0						1.8
T 515.00			0.0	0.2		0.2	0.2	0.2	0.0	0.0	0.0							0.8
H 505.00					0.0		0.1	0.0										0.2
	0.1	0.4	1.2	2.9	5.2	9.1	12.4	15.0	15.0	13.9	10.2	7.0	3.9	2.2	1.1	0.3	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 3324.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BUTTOCK-KNEE L'GTH	576.19	25.33	(0.439)*Y + (307.122)	22.70
Y-MID-SH'LDER HT/SIT	613.50	25.63	(0.449)*X + (354.792)	22.96

***

CORRELATION COEFFICIENT 0.444 (BASED ON ORIGINAL DATA) 0.444 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.448	0.916	15+3307	-0.11
Y AS A FUNCTION OF X	0.449	1.292	15+3307	0.85

BIVARIATE FREQUENCY TABLE FOR
BUTTOCK-KNEE LNTH AND SEATED EYE HEIGHT

SEATED EYE HEIGHT

BUTTOCK-KNEE LNTH	674.00	684.00	694.00	704.00	714.00	724.00	734.00	744.00	754.00	764.00	774.00	784.00	794.00	804.00	814.00	824.00	834.00	844.00	854.00	864.00	874.00	884.00	894.00	TOTAL
665.00										1			1	2			1	1						6
655.00														2		1								3
645.00									1			1		6	3	3		1	4				1	20
635.00								1	1	2	4	3	6	6	7	5	2			1				38
625.00						2		2	6	1	7	8	17	13	12	6	11	6		2				93
615.00					1	1	1	4	3	15	10	14	19	20	17	11	12	4						132
605.00					1	2	6	9	16	22	32	31	30	34	23	15	12	11	3	1				248
595.00					2	2	6	15	28	42	49	61	49	34	31	31	7	6	3					366
585.00				1	3	7	15	27	42	53	57	70	65	60	37	25	9	7	2	1				481
575.00	1				4	14	14	35	54	52	70	85	68	50	21	15	12	2	2					499
565.00				4	7	14	17	52	56	77	92	61	53	33	28	8	4	1	3	1				511
555.00			4	5	2	26	23	40	43	62	52	52	40	21	14	5	4							393
545.00	1		1	3	12	17	27	32	36	42	37	32	23	5	6	4	2	2						282
535.00		1	2	2	7	9	25	20	29	22	10	13	11	6	1		1							159
525.00		2		5	2	4	7	5	8	13	5	3	5	1		1								61
515.00					2	4	3	5	4	1	3	3	2											27
505.00							1		1	2		1												5
	2	3	7	20	43	102	145	247	328	407	428	438	389	293	200	130	77	41	17	6	0	0	1	3324

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BUTTOCK-KNEE L'GTH	576.19	25.33	(0.358)*Y + (297.586)	22.98
Y-EYE HT/SITTING	778.89	29.74	(0.493)*X + (494.743)	26.99

***
CORRELATION COEFFICIENT 0.420 (BASED ON ORIGINAL DATA) 0.418 (BASED ON GROUPED DATA)
***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.423	0.990	19+3303	0.08
Y AS A FUNCTION OF X	0.421	0.870	15+3307	-0.25

BIVARIATE FREQUENCY TABLE FOR
BUTTOCK-KNEE LNTH AND SEATED EYE HEIGHT

SEATED EYE HEIGHT

	674.00	684.00	694.00	704.00	714.00	724.00	734.00	744.00	754.00	764.00	774.00	784.00	794.00	804.00	814.00	824.00	834.00	844.00	854.00	864.00	874.00	884.00	894.00	TOTAL
B 665.00										0.0			0.0	0.1			0.0	0.0						0.2
U 655.00														0.1		0.0								0.1
T 645.00									0.0			0.0		0.2	0.1	0.1		0.0	0.1				0.0	0.6
T 635.00								0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1			0.0				1.1
O 625.00						0.1		0.1	0.2	0.0	0.2	0.2	0.5	0.4	0.4	0.2	0.3	0.2		0.1				2.8
C 615.00					0.0	0.0	0.0	0.1	0.1	0.5	0.3	0.4	0.6	0.6	0.5	0.3	0.4	0.1						4.0
K 605.00					0.0	0.1	0.2	0.3	0.5	0.7	1.0	0.9	0.9	1.0	0.7	0.5	0.4	0.3	0.1	0.0				7.5
- 595.00					0.1	0.1	0.2	0.5	0.8	1.3	1.5	1.8	1.5	1.0	0.9	0.9	0.2	0.2	0.1					11.0
K 585.00				0.0	0.1	0.2	0.5	0.8	1.3	1.6	1.7	2.1	2.0	1.8	1.1	0.8	0.3	0.2	0.1	0.0				14.5
N 575.00	0.0				0.1	0.4	0.4	1.1	1.6	1.6	2.1	2.6	2.0	1.5	0.6	0.5	0.4	0.1	0.1					15.0
E 565.00				0.1	0.2	0.4	0.5	1.6	1.7	2.3	2.8	1.8	1.6	1.0	0.8	0.2	0.1	0.0	0.1	0.0				15.4
E 555.00			0.1	0.2	0.1	0.8	0.7	1.2	1.3	1.9	1.6	1.6	1.2	0.6	0.4	0.2	0.1							11.8
545.00	0.0		0.0	0.1	0.4	0.5	0.8	1.0	1.1	1.3	1.1	1.0	0.7	0.2	0.2	0.1	0.1	0.1						8.5
L 535.00		0.0	0.1	0.1	0.2	0.3	0.8	0.6	0.9	0.7	0.3	0.4	0.3	0.2	0.0		0.0							4.8
N 525.00		0.1		0.2	0.1	0.1	0.2	0.2	0.2	0.4	0.2	0.1	0.2	0.0		0.0								1.8
T 515.00					0.1	0.1	0.1	0.2	0.1	0.0	0.1	0.1	0.1											0.8
H 505.00							0.0		0.0	0.1		0.0												0.2
	0.1	0.1	0.2	0.6	1.3	3.1	4.4	7.4	9.9	12.2	12.9	13.2	11.7	8.8	6.0	3.9	2.3	1.2	0.5	0.2	0.	0.	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 3324.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BUTTOCK-KNEE L'GTH	576.19	25.33	(0.358)*Y + (297.586)	22.98
Y-EYE HT/SITTING	778.89	29.74	(0.493)*X + (494.743)	26.99

***

CORRELATION COEFFICIENT 0.420 (BASED ON ORIGINAL DATA) 0.418 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.423	0.990	19+3303	0.08
Y AS A FUNCTION OF X	0.421	0.870	15+3307	-0.25

BIVARIATE FREQUENCY TABLE FOR
BUTTOCK-KNEE LNTH AND KNEE HEIGHT

KNEE HEIGHT

BUTTOCK-KNEE LNTH	454 .00	464 .00	474 .00	484 .00	494 .00	504 .00	514 .00	524 .00	534 .00	544 .00	554 .00	564 .00	574 .00	584 .00	594 .00	604 .00	614 .00	624 .00	TOTAL
B 665.00														1	2	2	1		6
U 655.00													2		1				3
T 645.00													2	10	3	4		1	20
T 635.00										1	6	2	11	10	3	4	1		38
C 625.00										6	18	28	21	17	3				93
C 615.00							1	2	7	12	42	34	24	10					132
K 605.00							3	7	21	57	73	65	16	5		1			248
- 595.00						10	29	31	52	102	84	43	12	2	1				366
K 585.00						16	91	70	108	119	56	21							481
N 575.00				1	12	38	152	103	107	63	20	3							499
E 565.00				10	28	96	196	97	60	20	2	2							511
E 555.00		1	2	30	49	116	129	49	14	2	1								393
545.00		1	9	38	66	92	67	5	3	1									282
L 535.00			9	56	50	28	15		1										159
N 525.00	1	2	9	26	17	4	2												61
T 515.00		3	7	9	5	3													27
H 505.00	1		3	1															5
	2	7	39	171	227	403	685	364	373	383	302	198	88	55	13	11	2	1	3324

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BUTTOCK-KNEE L'GTH	576.19	25.33	(0.840)*Y + (132.778)	13.47
Y-KNEE HGT/SITTING	527.66	25.52	(0.853)*X + (35.984)	13.57

***

CORRELATION COEFFICIENT 0.847 (BASED ON ORIGINAL DATA) 0.840 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.841	2.029	16+3306	2.37
Y AS A FUNCTION OF X	0.842	2.420	15+3307	2.92

BIVARIATE FREQUENCY TABLE FOR
BUTTOCK-KNEE LNTH AND KNEE HEIGHT

KNEE HEIGHT

	454 .00	464 .00	474 .00	484 .00	494 .00	504 .00	514 .00	524 .00	534 .00	544 .00	554 .00	564 .00	574 .00	584 .00	594 .00	604 .00	614 .00	624 .00	TOTAL
B 665.00														0.0	0.1	0.1	0.0		0.2
U 655.00													0.1		0.0				0.1
T 645.00													0.1	0.3	0.1	0.1		0.0	0.6
T 635.00										0.0	0.2	0.1	0.3	0.3	0.1	0.1	0.0		1.1
O 625.00										0.2	0.5	0.8	0.6	0.5	0.1				2.8
C 615.00							0.0	0.1	0.2	0.4	1.3	1.0	0.7	0.3					4.0
K 605.00							0.1	0.2	0.6	1.7	2.2	2.0	0.5	0.2		0.0			7.5
- 595.00						0.3	0.9	0.9	1.6	3.1	2.5	1.3	0.4	0.1	0.0				11.0
K 585.00						0.5	2.7	2.1	3.2	3.6	1.7	0.6							14.5
N 575.00				0.0	0.4	1.1	4.6	3.1	3.2	1.9	0.6	0.1							15.0
E 565.00				0.3	0.8	2.9	5.9	2.9	1.8	0.6	0.1	0.1							15.4
E 555.00		0.0	0.1	0.9	1.5	3.5	3.9	1.5	0.4	0.1	0.0								11.8
545.00		0.0	0.3	1.1	2.0	2.8	2.0	0.2	0.1	0.0									8.5
L 535.00			0.3	1.7	1.5	0.8	0.5		0.0										4.8
N 525.00	0.0	0.1	0.3	0.8	0.5	0.1	0.1												1.8
T 515.00		0.1	0.2	0.3	0.2	0.1													0.8
H 505.00	0.0		0.1	0.0															0.2
	0.1	0.2	1.2	5.1	6.8	12.1	20.6	11.0	11.2	11.5	9.1	6.0	2.6	1.7	0.4	0.3	0.1	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 3324.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-BUTTOCK-KNEE L'GTH	576.19	25.33	(0.840)*Y + (132.778)	13.47
Y-KNEE HGT/SITTING	527.66	25.52	(0.853)*X + (35.984)	13.57

***

CORRELATION COEFFICIENT 0.847 (BASED ON ORIGINAL DATA) 0.840 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.841	2.029	16+3306	2.37
Y AS A FUNCTION OF X	0.842	2.420	15+3307	2.92

BIVARIATE FREQUENCY TABLE FOR
STATURE AND SEATED HEIGHT

SEATED HEIGHT

	774.00	784.00	794.00	804.00	814.00	824.00	834.00	844.00	854.00	864.00	874.00	884.00	894.00	904.00	914.00	924.00	934.00	944.00	954.00	964.00	974.00	984.00	994.00	TOTAL
1910.00																					1		1	2
1890.00																			2	1		1		4
1870.00															2	1		3	2	3		1	1	13
1850.00																1	6	5	6	3	1	1		23
1830.00														3	1	3	8	8	8	5	2	3	1	42
1810.00														3	10	10	12	19	17	15	6	2		94
S1790.00												1	4	12	17	21	27	30	19	8	5	1		145
T1770.00									1	1	3	5	18	23	22	40	51	27	10	9	1			211
A1750.00								1	2	5	6	19	34	52	63	65	35	26	8	7		1		324
T1730.00								1	1	16	16	46	54	78	75	62	29	19	5	1				403
U1710.00							2	1	4	15	26	59	74	88	65	48	18	5	5					410
R1690.00							1	4	7	23	59	78	88	76	57	27	7	2						429
E1670.00						1	5	10	22	42	56	96	65	53	28	15	1	1						395
1650.00					1	1	4	13	36	44	68	60	35	24	8	6								300
1630.00						7	5	28	29	50	41	40	19	12		1								232
1610.00					2	12	10	20	29	37	24	15	5	2	1									157
1590.00					6	3	15	18	19	11	8	6	1											87
1570.00			1	1	2	5	5	9	10	2		1	1											37
1550.00				1	2	2	1	1	2															9
1530.00			1			1		1																3
1510.00			1		1	1																		3
1490.00	1																							1
	1	0	3	2	14	33	48	167	162	246	307	426	398	426	349	300	194	145	82	52	16	10	3	3324

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1702.18	59.87	(1.493)*Y + (359.893)	37.83
Y-SITTING HEIGHT	898.78	31.07	(0.402)*X + (214.188)	19.63

***

CORRELATION COEFFICIENT 0.775 (BASED ON ORIGINAL DATA) 0.772 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.773	1.085	20+3302	0.37
Y AS A FUNCTION OF X	0.774	1.453	20+3302	1.36

BIVARIATE FREQUENCY TABLE FOR
STATURE AND SEATED HEIGHT

SEATED HEIGHT

	774.00	784.00	794.00	804.00	814.00	824.00	834.00	844.00	854.00	864.00	874.00	884.00	894.00	904.00	914.00	924.00	934.00	944.00	954.00	964.00	974.00	984.00	994.00	TOTAL
1910.00																					0.0		0.0	0.1
1890.00																			0.1	0.0		0.0		0.1
1870.00															0.1	0.0		0.1	0.1	0.1		0.0	0.0	0.4
1850.00																0.0	0.2	0.2	0.2	0.1	0.0	0.0		0.7
1830.00														0.1	0.0	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.0	1.3
1810.00														0.1	0.3	0.3	0.4	0.6	0.5	0.5	0.2	0.1		2.8
S1790.00												0.0	0.1	0.4	0.5	0.6	0.8	0.9	0.6	0.2	0.2	0.0		4.4
T1770.00									0.0	0.0	0.1	0.2	0.5	0.7	0.7	1.2	1.5	0.8	0.3	0.3	0.0			6.3
A1750.00								0.0	0.1	0.2	0.2	0.6	1.0	1.6	1.9	2.0	1.1	0.8	0.2	0.2		0.0		9.7
T1730.00								0.0	0.0	0.5	0.5	1.4	1.6	2.3	2.3	1.9	0.9	0.6	0.2	0.0				12.1
U1710.00							0.1	0.0	0.1	0.5	0.8	1.8	2.2	2.6	2.0	1.4	0.5	0.2	0.2					12.3
R1690.00							0.0	0.1	0.2	0.7	1.8	2.3	2.6	2.3	1.7	0.8	0.2	0.1						12.9
E1670.00						0.0	0.2	0.3	0.7	1.3	1.7	2.9	2.0	1.6	0.8	0.5	0.0	0.0						11.9
1650.00					0.0	0.0	0.1	0.4	1.1	1.3	2.0	1.8	1.1	0.7	0.2	0.2								9.0
1630.00						0.2	0.2	0.8	0.9	1.5	1.2	1.2	0.6	0.4		0.0								7.0
1610.00					0.1	0.4	0.3	0.6	0.9	1.1	0.7	0.5	0.2	0.1	0.0									4.7
1590.00					0.2	0.1	0.5	0.5	0.6	0.3	0.2	0.2	0.0											2.6
1570.00			0.0	0.0	0.1	0.2	0.2	0.3	0.3	0.1		0.0	0.0											1.1
1550.00				0.0	0.1	0.1	0.0	0.0	0.1															0.3
1530.00			0.0			0.0		0.0																0.1
1510.00			0.0		0.0	0.0																		0.1
1490.00	0.0																							0.0
	0.0	0.	0.1	0.1	0.4	1.0	1.4	3.2	4.9	7.4	9.2	12.8	12.0	12.8	10.5	9.0	5.8	4.4	2.5	1.6	0.5	0.3	0.1	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 3324.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1702.18	59.87	(1.493)*Y + (359.893)	37.83
Y-SITTING HEIGHT	898.78	31.07	(0.402)*X + (214.188)	19.63

***
CORRELATION COEFFICIENT 0.775 (BASED ON ORIGINAL DATA) 0.772 (BASED ON GROUPED DATA)
***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.773	1.085	20+3302	0.37
Y AS A FUNCTION OF X	0.774	1.453	20+3302	1.36

BIVARIATE FREQUENCY TABLE FOR STATURE AND SEATED EYE HEIGHT

SEATED EYE HEIGHT

STATURE	674.00	684.00	694.00	704.00	714.00	724.00	734.00	744.00	754.00	764.00	774.00	784.00	794.00	804.00	814.00	824.00	834.00	844.00	854.00	864.00	874.00	884.00	894.00	TOTAL
1910.00																			1				1	2
1890.00																1	1		2					4
1870.00													1	1	7			1	1	2				13
1850.00										1				5	3	6	3	5						23
1830.00												1	5	8	6	8	5	7	1	1				42
1810.00									1		2	3	14	14	13	11	22	9	2	3				94
S1790.00									1	2	6	11	17	27	29	27	15	8	2					145
T1770.00								4	4	7	14	31	32	40	29	30	11	6	3					211
A1750.00						2	2	3	10	25	45	50	51	59	46	16	9	2	4					324
T1730.00					1	1	3	12	20	45	58	78	76	58	25	17	7	2						403
U1710.00					3	1	8	17	29	53	75	78	73	32	26	9	4	1	1					410
R1690.00						4	8	25	57	68	78	85	71	21	9	3								429
E1670.00					2	9	19	42	64	76	75	55	26	19	6	2								395
1650.00				2	5	16	20	57	52	59	36	29	15	8	1									300
1630.00			2	1	4	21	24	46	53	37	27	9	7	1										232
1610.00			1	6	10	23	28	26	23	24	9	6	1											157
1590.00		1	2	5	8	15	21	12	12	7	2	2												87
1570.00	1		1	3	8	6	10	3	2	2	1													37
1550.00			1	2	2	1	2			1														9
1530.00	1					2																		3
1510.00		1		1		1																		3
1490.00		1																						1
	2	3	7	20	43	102	145	247	328	407	428	438	389	293	200	130	77	41	17	6	0	0	1	3324

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1702.18	59.87	(1.459)*Y + (565.800)	41.25
Y-EYE HT/SITTING	778.89	29.74	(0.360)*X + (166.126)	20.49

***

CORRELATION COEFFICIENT 0.725 (BASED ON ORIGINAL DATA) 0.719 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.720	0.813	19+3303	-0.51
Y AS A FUNCTION OF X	0.721	1.248	20+3302	0.83

BIVARIATE FREQUENCY TABLE FOR
STATURE AND SEATED EYE HEIGHT

SEATED EYE HEIGHT

	674 .0C	684 .00	694 .00	704 .00	714 .C0	724 .00	734 .00	744 .00	754 .00	764 .00	774 .00	784 .00	794 .00	804 .00	814 .00	824 .00	834 .00	844 .00	854 .00	864 .00	874 .00	884 .00	894 .00	TOTAL
1910.00																			0.0				0.0	0.1
1890.00																0.0	0.0		0.1					0.1
1870.00													0.0	0.0	0.2			0.0	0.0	0.1				0.4
1850.00										0.0				0.2	0.1	0.2	0.1	0.2						0.7
1830.00												0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.0				1.3
1810.00									0.0		0.1	0.1	0.4	0.4	0.4	0.3	0.7	0.3	0.1	0.1				2.8
S1790.00									0.0	C.1	0.2	0.3	0.5	0.8	0.9	0.8	0.5	0.2	0.1					4.4
T1770.00								0.1	0.1	0.2	0.4	0.9	1.0	1.2	0.9	0.9	0.3	0.2	0.1					6.3
A1750.00						C.1	0.1	C.1	C.3	0.8	1.4	1.5	1.5	1.8	1.4	0.5	0.3	0.1	0.1					9.7
T1730.00					0.0	0.0	0.1	0.4	0.6	1.4	1.7	2.3	2.3	1.7	0.8	0.5	0.2	0.1						12.1
U1710.00					0.1	C.0	0.2	C.5	0.9	1.6	2.3	2.3	2.2	1.0	0.8	0.3	0.1	0.0	0.0					12.3
R1690.00						0.1	0.2	0.8	1.7	2.0	2.3	2.6	2.1	0.6	0.3	0.1								12.9
E1670.00					0.1	0.3	0.6	1.3	1.9	2.3	2.3	1.7	C.8	0.6	0.2	0.1								11.9
1650.00				0.1	0.2	0.5	0.6	1.7	1.6	1.8	1.1	0.9	0.5	0.2	0.0									9.0
1630.00			0.1	0.0	0.1	C.6	0.7	1.4	1.6	1.1	0.8	0.3	0.2	0.0										7.0
1610.00			0.0	0.2	0.3	0.7	0.8	0.8	0.7	0.7	C.3	0.2	0.0											4.7
1590.00		0.0	0.1	0.2	0.2	C.5	0.6	0.4	0.4	0.2	0.1	0.1												2.6
1570.00	0.0		0.0	0.1	0.2	0.2	0.3	0.1	0.1	0.1	0.0													1.1
1550.00			0.0	0.1	0.1	0.0	0.1			0.0														0.3
1530.00	0.C					0.1																		0.1
1510.00		0.0		0.0		0.0																		0.1
1490.00		0.0																						0.0
	0.1	0.1	0.2	0.6	1.3	3.1	4.4	7.4	9.9	12.2	12.9	13.2	11.7	8.8	6.0	3.9	2.3	1.2	0.5	0.2	0.	0.	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 3324.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1702.18	59.87	(1.459)*Y + (565.800)	41.25
Y-EYE HT/SITTING	778.89	29.74	(0.360)*X + (166.126)	20.49

***

CORRELATION COEFFICIENT 0.725 (BASED ON ORIGINAL DATA) 0.719 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.720	0.813	19+3303	-0.51
Y AS A FUNCTION OF X	0.721	1.248	20+3302	0.83

BIVARIATE FREQUENCY TABLE FOR
STATURE AND KNEE HEIGHT

KNEE HEIGHT

STATURE	454.00	464.00	474.00	484.00	494.00	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	TOTAL
1910.00														1		1			2
1890.00														1	1	1		1	4
1870.00													2	3	3	3	2		13
1850.00													7	10	4	2			23
1830.00												11	12	12	5	2			42
1810.00							1		1	3	16	42	14	15		2			94
S1790.00						1	1	1	8	18	43	42	23	8					145
T1770.00							7	6	18	48	74	35	18	5					211
A1750.00						2	28	18	46	96	85	42	7						324
T1730.00						10	75	47	94	104	52	16	5						403
U1710.00						28	107	71	90	80	24	10							410
R1690.00				7	13	54	155	102	71	20	7								429
E1670.00				7	30	80	152	74	38	13	1								395
1650.00			3	17	47	96	98	33	6										300
1630.00				42	56	79	46	8	1										232
1610.00		2	6	41	50	41	12	4		1									157
1590.00		1	10	41	22	10	3												87
1570.00	2	1	11	12	9	2													37
1550.00			7	2															9
1530.00		1		2															3
1510.00		2	1																3
1490.00			1																1
	2	7	39	171	227	403	685	364	373	383	302	198	88	55	13	11	2	1	3324

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1702.18	59.87	(2.009)*Y + (642.148)	30.91
Y-KNEE HGT/SITTING	527.66	25.52	(0.365)*X + (-93.787)	13.18

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CORRELATION COEFFICIENT 0.856 (BASED ON ORIGINAL DATA) 0.850 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.853	4.710	16+3306	5.82
Y AS A FUNCTION OF X	0.853	2.933	20+3302	4.17

BIVARIATE FREQUENCY TABLE FOR
STATURE AND KNEE HEIGHT

KNEE HEIGHT

	454 .00	464 .00	474 .00	484 .00	494 .00	504 .00	514 .00	524 .00	534 .00	544 .00	554 .00	564 .00	574 .00	584 .00	594 .00	604 .00	614 .00	624 .00	TOTAL
1910.00														0.0		0.0			0.1
1890.00														0.0	0.0	0.0		0.0	0.1
1870.00													0.1	0.1	0.1	0.1	0.1		0.4
1850.00													0.2	0.3	0.1	0.1			0.7
1830.00												0.3	0.4	0.4	0.2	0.1			1.3
1810.00							0.0		0.0	0.1	0.5	1.3	0.4	0.5		0.1			2.8
S1790.00						0.0	0.0	0.0	0.2	0.5	1.3	1.3	0.7	0.2					4.4
T1770.00							0.2	0.2	0.5	1.4	2.2	1.1	0.5	0.2					6.3
A1750.00						0.1	0.8	0.5	1.4	2.9	2.6	1.3	0.2						9.7
T1730.00						0.3	2.3	1.4	2.8	3.1	1.6	0.5	0.2						12.1
U1710.00						0.8	3.2	2.1	2.7	2.4	0.7	0.3							12.3
R1690.00				0.2	0.4	1.6	4.7	3.1	2.1	0.6	0.2								12.9
E1670.00				0.2	0.9	2.4	4.6	2.2	1.1	0.4	0.0								11.9
1650.00			0.1	0.5	1.4	2.9	2.9	1.0	0.2										9.0
1630.00				1.3	1.7	2.4	1.4	0.2	0.0										7.0
1610.00		0.1	0.2	1.2	1.5	1.2	0.4	0.1		0.0									4.7
1590.00		0.0	0.3	1.2	0.7	0.3	0.1												2.6
1570.00	0.1	0.0	0.3	0.4	0.3	0.1													1.1
1550.00			0.2	0.1															0.3
1530.00		0.0		0.1															0.1
1510.00		0.1	0.0																0.1
1490.00			0.0																0.0
	0.1	0.2	1.2	5.1	6.8	12.1	20.6	11.0	11.2	11.5	9.1	6.0	2.6	1.7	0.4	0.3	0.1	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 3324.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1702.18	59.87	(2.009)*Y + (642.148)	30.91
Y-KNEE HGT/SITTING	527.66	25.52	(0.365)*X + (-93.787)	13.18

***

CORRELATION COEFFICIENT 0.856 (BASED ON ORIGINAL DATA) 0.850 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.853	4.710	16+3306	5.82
Y AS A FUNCTION OF X	0.853	2.933	20+3302	4.17

BIVARIATE FREQUENCY TABLE FOR STATURE AND BUTTOCK-KNEE LENGTH

BUTTOCK-KNEE LENGTH

	504 .00	514 .C0	524 .00	534 .00	544 .00	554 .00	564 .00	574 .00	584 .00	594 .00	604 .00	614 .00	624 .00	634 .00	644 .00	654 .00	664 .00	TOTAL
1910.00															2			2
1890.00															2	1	1	4
1870.00													3	4	3		3	13
1850.00												4	6	7	4	1	1	23
1830.00										3	4	9	10	9	7			42
1810.00							2		4	11	24	20	25	4	2	1	1	94
S1790.00							1	5	19	28	36	28	19	9				145
T1770.00						1	1	17	40	50	55	28	18	1				211
A1750.00					1	3	16	37	92	87	55	22	9	2				324
T1730.00				1	2	8	41	93	99	96	44	16	3					403
U1710.00					9	33	80	94	106	62	22	3		1				410
R1690.00		1	1	2	32	61	120	124	61	21	5			1				429
E1670.00			1	11	35	96	122	72	47	6	3	2						395
1650.00			10	27	56	82	80	35	9	1								300
1630.00		5	8	35	70	68	29	14	3	1								232
1610.00	1	9	13	39	46	25	16	7	1									157
1590.00	1	6	13	28	20	15	4											87
1570.00	3	3	9	13	7	1		1										37
1550.00		1	2	3	3													9
1530.00		1	1		1													3
1510.00		1	2															3
1490.00			1															1
	5	27	61	159	282	393	511	499	481	366	248	132	93	38	20	3	6	3324

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1702.18	59.87	(1.961)*Y + (572.088)	33.42
Y-BUTTOCK-KNEE L'GTH	576.19	25.33	(0.351)*X + (-21.294)	14.14

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CORRELATION COEFFICIENT 0.830 (BASED ON ORIGINAL DATA) 0.825 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.826	1.302	15+3307	0.88
Y AS A FUNCTION OF X	0.827	2.042	20+3302	2.64

BIVARIATE FREQUENCY TABLE FOR
STATURE AND BUTTOCK-KNEE LENGTH

BUTTOCK-KNEE LENGTH

	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	634.00	644.00	654.00	664.00	TOTAL
1910.00															0.1			0.1
1890.00															0.1	0.0	0.0	0.1
1870.00													0.1	0.1	0.1		0.1	0.4
1850.00												0.1	0.2	0.2	0.1	0.0	0.0	0.7
1830.00										0.1	0.1	0.3	0.3	0.3	0.2			1.3
1810.00							0.1		0.1	0.3	0.7	0.6	0.8	0.1	C.1	0.0	0.0	2.8
S1790.00							0.0	0.2	0.6	0.8	1.1	0.8	0.6	0.3				4.4
T1770.00						0.0	0.0	0.5	1.2	1.5	1.7	0.8	0.5	0.0				6.3
A1750.00					0.0	0.1	0.5	1.1	2.8	2.6	1.7	0.7	0.3	0.1				9.7
T1730.00				0.0	0.1	0.2	1.2	2.8	3.0	2.9	1.3	0.5	0.1					12.1
U1710.00					0.3	1.0	2.4	2.8	3.2	1.9	0.7	0.1		0.0				12.3
R1690.00		0.0	0.0	0.1	1.0	1.8	3.6	3.7	1.8	0.6	0.2			0.0				12.9
E1670.00			C.0	0.3	1.1	2.9	3.7	2.2	1.4	C.2	0.1	0.1						11.9
1650.00			0.3	0.8	1.7	2.5	2.4	1.1	0.3	0.0								9.C
1630.00		0.2	0.2	1.1	2.1	2.C	0.8	0.4	0.1	0.0								7.0
1610.00	0.0	0.3	0.4	1.2	1.4	0.8	0.5	0.2	0.0									4.7
1590.00	C.0	0.2	0.4	0.8	0.6	0.5	0.1											2.6
1570.00	C.1	C.1	0.3	0.4	0.2	0.0		0.0										1.1
1550.00		0.0	C.1	0.1	0.1													0.3
1530.00		0.0	0.0		0.0													0.1
1510.00		0.0	0.1															0.1
1490.00			0.0															0.0
	0.2	0.8	1.8	4.8	8.5	11.8	15.4	15.0	14.5	11.0	7.5	4.0	2.8	1.1	0.6	0.1	0.2	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 3324.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1702.18	59.87	(1.961)*Y + (572.088)	33.42
Y-BUTTOCK-KNEE L'GTH	576.19	25.33	(0.351)*X + (-21.294)	14.14

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CORRELATION COEFFICIENT 0.830 (BASED ON ORIGINAL DATA) 0.825 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.826	1.302	15+3307	0.88
Y AS A FUNCTION OF X	0.827	2.042	20+3302	2.64

BIVARIATE FREQUENCY TABLE FOR
STATURE AND SEATED SHOULDER BREADTH

SEATED SHOULDER BREADTH

	374 .00	384 .00	394 .00	404 .00	414 .00	424 .00	434 .00	444 .00	454 .00	464 .00	474 .00	484 .00	494 .00	504 .00	514 .00	524 .00	534 .00	TOTAL
1910.00												1		1				2
1890.00										1			2			1		4
1870.00				1			1		1		6	1	1	2				13
1850.00						1		2	2	3	2	2	7	4				23
1830.00						2	4	3	9	6	6	2	5	3	1	1		42
1810.00					1		7	12	14	15	17	12	4	7	3	2		94
S1790.00					3	3	9	12	24	34	25	16	8	9	2			145
T1770.00				1	3	12	18	28	29	40	38	17	13	8	2		2	211
A1750.00				1	7	16	30	57	49	62	41	29	21	6	1	1	3	324
T1730.00			3	6	13	17	35	70	90	82	41	23	13	8	1	1		403
U1710.00		1	2	2	13	18	52	82	73	65	47	32	19	2	2			410
R1690.00		1	4	8	20	39	58	85	77	58	38	23	12	4	2			429
E1670.00		1	3	4	29	35	67	67	63	55	38	22	7	3	1			395
1650.00			2	11	31	39	58	53	43	35	11	11	3	2	1			300
1630.00			1	6	20	32	44	35	37	33	8	9	4	1	1	1		232
1610.00			2	8	18	27	29	29	17	14	6	4	2	1				157
1590.00	1	1	3	3	12	8	18	14	12	10	2	1	1	1				87
1570.00			2	1	2	9	6	5	6	3	3							37
1550.00					1		2	2			2	2						9
1530.00						2		1										3
1510.00						2		1										3
1490.00				1														1
	1	4	22	53	173	262	438	558	546	516	331	207	122	62	17	7	5	3324

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1702.18	59.87	(0.932)*Y + (1278.755)	55.80
Y-BIDELTOID(SHLDR)BR	454.14	23.26	(0.141)*X + (214.501)	21.68

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CORRELATION COEFFICIENT 0.362 (BASED ON ORIGINAL DATA) 0.361 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.367	1.169	15+3307	0.56
Y AS A FUNCTION OF X	0.372	1.517	20+3302	1.51

BIVARIATE FREQUENCY TABLE FOR
STATURE AND SEATED SHOULDER BREADTH

SEATED SHOULDER BREADTH

	374 .00	384 .00	394 .00	404 .00	414 .00	424 .00	434 .00	444 .00	454 .00	464 .00	474 .00	484 .00	494 .00	504 .00	514 .00	524 .00	534 .00	TOTAL
1910.00												0.0		0.0				0.1
1890.00										0.0			0.1			0.0		0.1
1870.00				0.0			0.0		0.0		0.2	0.0	0.0	0.1				0.4
1850.00						0.0		0.1	0.1	0.1	0.1	0.1	0.2	0.1				0.7
1830.00						0.1	0.1	0.1	0.3	0.2	0.2	0.1	0.2	0.1	0.0	0.0		1.3
1810.00					0.0		0.2	0.4	0.4	0.5	0.5	0.4	0.1	0.2	0.1	0.1		2.8
S1790.00					0.1	0.1	0.3	0.4	0.7	1.0	0.8	0.5	0.2	0.3	0.1			4.4
T1770.00				0.0	0.1	0.4	0.5	0.8	0.9	1.2	1.1	0.5	0.4	0.2	0.1		0.1	6.3
A1750.00				0.0	0.2	0.5	0.9	1.7	1.5	1.9	1.2	0.9	0.6	0.2	0.0	0.0	0.1	9.7
T1730.00			0.1	0.2	0.4	0.5	1.1	2.1	2.7	2.5	1.2	0.7	0.4	0.2	0.0	0.0		12.1
U1710.00		0.0	0.1	0.1	0.4	0.5	1.6	2.5	2.2	2.0	1.4	1.0	0.6	0.1	0.1			12.3
R1690.00		0.0	0.1	0.2	0.6	1.2	1.7	2.6	2.3	1.7	1.1	0.7	0.4	0.1	0.1			12.9
E1670.00		0.0	0.1	0.1	0.9	1.1	2.0	2.0	1.9	1.7	1.1	0.7	0.2	0.1	0.0			11.9
1650.00			0.1	0.3	0.9	1.2	1.7	1.6	1.3	1.1	0.3	0.3	0.1	0.1	0.0			9.0
1630.00			0.0	0.2	0.6	1.0	1.3	1.1	1.1	1.0	0.2	0.3	0.1	0.0	0.0	0.0		7.0
1610.00			0.1	0.2	0.5	0.8	0.9	0.9	0.5	0.4	0.2	0.1	0.1	0.0				4.7
1590.00	0.0	0.0	0.1	0.1	0.4	0.2	0.5	0.4	0.4	0.3	0.1	0.0	0.0	0.0				2.6
1570.00			0.1	0.0	0.1	0.3	0.2	0.2	0.2	0.1	0.1							1.1
1550.00					0.0		0.1	0.1			0.1	0.1						0.3
1530.00						0.1		0.0										0.1
1510.00						0.1		0.0										0.1
1490.00				0.0														0.0
	0.0	0.1	0.7	1.6	5.2	7.9	13.2	16.8	16.4	15.5	10.0	6.2	3.7	1.9	0.5	0.2	0.2	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 3324.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1702.18	59.87	(0.932)*Y + (1278.755)	55.80
Y-BIDELTOID(SHLDR)BR	454.14	23.26	(0.141)*X + (214.501)	21.68

***

CORRELATION COEFFICIENT 0.362 (BASED ON ORIGINAL DATA) 0.361 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.367	1.169	15+3307	0.56
Y AS A FUNCTION OF X	0.372	1.517	20+3302	1.51

BIVARIATE FREQUENCY TABLE FOR
STATURE AND SHOULDER-ELBOW LENGTH

SHOULDER-ELBOW LENGTH

STATURE	302.50	307.50	312.50	317.50	322.50	327.50	332.50	337.50	342.50	347.50	352.50	357.50	362.50	367.50	372.50	377.50	382.50	387.50	392.50	397.50	402.50	407.50	412.50	417.50	TOTAL
1910.00																			1		1				2
1890.00																1					1	1	1		4
1870.00															1	1	1	1	3	4			1	1	13
1850.00															5	2	5	4	3	2	2				23
1830.00										1		2	2	2	7	8	5	9	3	1	1		1		42
1810.00										2	2	8	6	12	17	23	12	4	5	1	1	1			94
S1790.00									1	3	4	11	14	35	25	20	17	11	3	1					145
T1770.00									5	9	14	21	35	35	43	22	15	7	4		1				211
A1750.00								3	6	23	33	45	67	55	43	31	9	5	3	1					324
T1730.00						1	3	9	17	36	63	79	67	63	44	8	10	3							403
U1710.00						2	4	12	54	53	88	81	54	33	19	6	3	1							410
R1690.00						8	17	32	71	74	83	78	42	13	10	1									429
E1670.00				1	4	21	38	55	67	69	62	44	18	11	4	1									395
1650.00				2	8	24	39	56	53	47	39	16	7	8	1										300
1630.00		1	2	4	14	31	44	43	28	35	17	10	2	1											232
1610.00		2	4	5	19	25	32	30	24	10	3	1	2												157
1590.00	1	1	3	9	13	16	20	11	10	2	1														87
1570.00		1	4	2	7	13	4	3	3																37
1550.00					1	4	2	1		1															9
1530.00		1	1			1																			3
1510.00	1		1	1																					3
1490.00					1																				1
	2	6	15	24	67	146	203	255	339	365	409	396	316	268	219	124	77	45	25	10	7	2	3	1	3324

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1702.18	59.87	(2.853)*Y + (692.807)	37.54
Y-SHOULDER-ELBOW LTH	353.82	16.35	(0.213)*X + (-8.274)	10.25

***

CORRELATION COEFFICIENT 0.779 (BASED ON ORIGINAL DATA) 0.776 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.777	0.452	22+3300	-2.21
Y AS A FUNCTION OF X	0.778	1.207	20+3302	0.72

BIVARIATE FREQUENCY TABLE FOR
STATURE AND SHOULDER-ELBOW LENGTH

SHOULDER-ELBOW LENGTH

	302.50	307.50	312.50	317.50	322.50	327.50	332.50	337.50	342.50	347.50	352.50	357.50	362.50	367.50	372.50	377.50	382.50	387.50	392.50	397.50	402.50	407.50	412.50	417.50	TOTAL
1910.00																			0.0		0.0				0.1
1890.00																0.0					0.0	0.0	0.0		0.1
1870.00															0.0	0.0	0.0	0.0	0.1	0.1			0.0	0.0	0.4
1850.00															0.2	0.1	0.2	0.1	0.1	0.1	0.1				0.7
1830.00										0.0		0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.1	0.0	0.0		0.0		1.3
1810.00										0.1	0.1	0.2	0.2	0.4	0.5	0.7	0.4	0.1	0.2	0.0	0.0	0.0			2.8
S1790.00									0.0	0.1	0.1	0.3	0.4	1.1	0.8	0.6	0.5	0.3	0.1	0.0					4.4
T1770.00									0.2	0.3	0.4	0.6	1.1	1.1	1.3	0.7	0.5	0.2	0.1		0.0				6.3
A1750.00								0.1	0.2	0.7	1.0	1.4	2.0	1.7	1.3	0.9	0.3	0.2	0.1	0.0					9.7
T1730.00						0.0	0.1	0.3	0.5	1.1	1.9	2.4	2.0	1.9	1.3	0.2	0.3	0.1							12.1
U1710.00						0.1	0.1	0.4	1.6	1.6	2.6	2.4	1.6	1.0	0.6	0.2	0.1	0.0							12.3
R1690.00						0.2	0.5	1.0	2.1	2.2	2.5	2.3	1.3	0.4	0.3	0.0									12.9
E1670.00				0.0	0.1	0.6	1.1	1.7	2.0	2.1	1.9	1.3	0.5	0.3	0.1	0.0									11.9
1650.00				0.1	0.2	0.7	1.2	1.7	1.6	1.4	1.2	0.5	0.2	0.2	0.0										9.0
1630.00		0.0	0.1	0.1	0.4	0.9	1.3	1.3	0.8	1.1	0.5	0.3	0.1	0.0											7.0
1610.00		0.1	0.1	0.2	0.6	0.8	1.0	0.9	0.7	0.3	0.1	0.0	0.1												4.7
1590.00	0.0	0.0	0.1	0.3	0.4	0.5	0.6	0.3	0.3	0.1	0.0														2.6
1570.00		0.0	0.1	0.1	0.2	0.4	0.1	0.1	0.1																1.1
1550.00					0.0	0.1	0.1	0.0		0.0															0.3
1530.00		0.0	0.0			0.0																			0.1
1510.00	0.0		0.0	0.0																					0.1
1490.00					0.0																				0.0
	0.1	0.2	0.5	0.7	2.0	4.4	6.1	7.7	10.2	11.0	12.3	11.9	9.5	8.1	6.6	3.7	2.3	1.4	0.8	0.3	0.2	0.1	0.1	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 3324.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-HEIGHT (STATURE)	1702.18	59.87	(2.853)*Y + (692.807)	37.54
Y-SHOULDER-ELBOW LTH	353.82	16.35	(0.213)*X + (-8.274)	10.25

***

CORRELATION COEFFICIENT 0.779 (BASED ON ORIGINAL DATA) 0.776 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.777	0.452	22+3300	-2.21
Y AS A FUNCTION OF X	0.778	1.207	20+3302	0.72

BIVARIATE FREQUENCY TABLE FOR
SEATO SHOULDR HT AND KNEE HEIGHT

KNEE HEIGHT

		454.00	464.00	474.00	484.00	494.00	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	TOTAL
S	695.00							1							1					2
E	685.00						1			2	1	2	3		2					11
A	675.00									2	6	10	9	5	2		1		1	36
T	665.00							8	6	7	7	15	10	8	8	2	2			73
E	655.00				1		3	19	6	18	20	22	19	11	7	4	1			131
	645.00				1	3	12	30	23	29	42	34	28	18	9	4	1			234
S	635.00			1	4	7	23	70	29	35	57	47	38	7	13	2	4	2		339
H	625.00			1	13	23	35	83	59	72	73	48	34	12	6		2			461
C	615.00				9	23	64	106	65	72	67	52	24	11	5	1				499
U	605.00	1	1	10	25	42	79	126	68	47	49	30	13	7						498
L	595.00	1	1	3	35	35	57	98	52	57	29	27	8	6	2					411
D	585.00		1	5	28	44	63	73	26	19	21	10	9	2						301
R	575.00		1	4	22	25	42	39	20	7	10	3	1							174
	565.00		1	8	18	19	11	23	8	3	1	2	2	1						97
H	555.00		1	4	9	6	11	5	2	3										41
T	545.00			3	4		1	4												12
	535.00		1		2		1													4
		2	7	39	171	227	403	685	364	373	383	302	198	88	55	13	11	2	1	3324

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-MID-SH'LDER HT/SIT	613.50	25.63	(0.501)*Y + (349.401)	22.21
Y-KNEE HGT/SITTING	527.66	25.52	(0.496)*X + (223.089)	22.12

***

CORRELATION COEFFICIENT 0.498 (BASED ON ORIGINAL DATA) 0.496 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.500	1.077	16+3306	0.33
Y AS A FUNCTION OF X	0.500	1.402	15+3307	1.10

BIVARIATE FREQUENCY TABLE FOR
SEATD SHOULDR HT AND KNEE HEIGHT

KNEE HEIGHT

	454.00	464.00	474.00	484.00	494.00	504.00	514.00	524.00	534.00	544.00	554.00	564.00	574.00	584.00	594.00	604.00	614.00	624.00	TOTAL
S 695.00							0.0							0.0					0.1
E 685.00						0.0			0.1	0.0	0.1	0.1		0.1					0.3
A 675.00									0.1	0.2	0.3	0.3	0.2	0.1		0.0		0.0	1.1
T 665.00							0.2	0.2	0.2	0.2	0.5	0.3	0.2	0.2	0.1	0.1			2.2
C 655.00				0.0		0.1	0.6	0.2	0.5	0.6	0.7	0.6	0.3	0.2	0.1	0.0			3.9
645.00				0.0	0.1	0.4	0.9	0.7	0.9	1.3	1.0	0.8	0.5	0.3	0.1	0.0			7.0
S 635.00			0.0	0.1	0.2	0.7	2.1	0.9	1.1	1.7	1.4	1.1	0.2	0.4	0.1	0.1	0.1		10.2
P 625.00			0.0	0.4	0.7	1.1	2.5	1.8	2.2	2.2	1.4	1.0	0.4	0.2		0.1			13.9
C 615.00				0.3	0.7	1.9	3.2	2.0	2.2	2.0	1.6	0.7	0.3	0.2	0.0				15.0
U 605.00	0.0	0.0	0.3	0.8	1.3	2.4	3.8	2.0	1.4	1.5	0.9	0.4	0.2						15.0
L 595.00	0.0	0.0	0.1	1.1	1.1	1.7	2.9	1.6	1.7	0.9	0.8	0.2	0.2	0.1					12.4
C 585.00		0.0	0.2	0.8	1.3	1.9	2.2	0.8	0.6	0.6	0.3	0.3	0.1						9.1
R 575.00		0.0	0.1	0.7	0.8	1.3	1.2	0.6	0.2	0.3	0.1	0.0							5.2
565.00		0.0	0.2	0.5	0.6	0.3	0.7	0.2	0.1	0.0	0.1	0.1	0.0						2.9
H 555.00		0.0	0.1	0.3	0.2	0.3	0.2	0.1	0.1										1.2
T 545.00			0.1	0.1		0.0	0.1												0.4
535.00		0.0		0.1		0.0													0.1
	0.1	0.2	1.2	5.1	6.8	12.1	20.6	11.0	11.2	11.5	9.1	6.0	2.6	1.7	0.4	0.3	0.1	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 3324.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-MID-SH'LDER HT/SIT	613.50	25.63	(0.501)*Y + (349.401)	22.21
Y-KNEE HGT/SITTING	527.66	25.52	(0.496)*X + (223.089)	22.12

***

CORRELATION COEFFICIENT 0.498 (BASED ON ORIGINAL DATA) 0.496 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.500	1.077	16+3306	0.33
Y AS A FUNCTION OF X	0.500	1.402	15+3307	1.10

BIVARIATE FREQUENCY TABLE FOR
SEATD SHOULDR HT AND SEATED EYE HEIGHT

SEATED EYE HEIGHT

SEATD SHOULDR HT	674.00	684.00	694.00	704.00	714.00	724.00	734.00	744.00	754.00	764.00	774.00	784.00	794.00	804.00	814.00	824.00	834.00	844.00	854.00	864.00	874.00	884.00	894.00	TOTAL
695.00																				1			1	2
685.00															1		2	2	5	1				11
675.00													1		3	7	10	9	3	3				36
665.00												2	1	7	12	15	18	13	4	1				73
655.00										1	3	1	5	25	36	33	14	11	2					131
645.00										3	9	20	31	51	48	39	26	4	3					234
635.00								1	3	8	32	38	81	85	57	28	4	2						339
625.00							1	4	11	31	59	110	132	73	33	5	2							461
615.00						3	2	8	38	72	106	126	92	38	10	3	1							499
605.00					1	3	8	40	75	114	118	93	32	14										498
595.00						10	27	65	96	97	65	38	13											411
585.00				2	6	24	35	59	73	61	32	8	1											301
575.00			1	2	9	22	46	47	23	19	3	2												174
565.00			2	7	16	26	18	19	7	1	1													97
555.00		1	2	3	8	13	8	4	2															41
545.00		2	2	4	3	1																		12
535.00	2			2																				4
	2	3	7	20	43	102	145	247	328	407	428	438	389	293	200	130	77	41	17	6	0	0	1	3324

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-MID-SH'LDER HT/SIT	613.50	25.63	(0.727)*Y + (46.913)	13.74
Y-EYE HT/SITTING	778.89	29.74	(0.980)*X + (177.899)	15.94

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CORRELATION COEFFICIENT 0.844 (BASED ON ORIGINAL DATA) 0.841 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.841	0.764	19+3303	-0.69
Y AS A FUNCTION OF X	0.841	0.990	15+3307	0.09

BIVARIATE FREQUENCY TABLE FOR
SEATD SHOULDR HT AND SEATED EYE HEIGHT

SEATED EYE HEIGHT

	674.00	684.00	694.00	704.00	714.00	724.00	734.00	744.00	754.00	764.00	774.00	784.00	794.00	804.00	814.00	824.00	834.00	844.00	854.00	864.00	874.00	884.00	894.00	TOTAL
S 695.00																				0.0			0.0	0.1
E 685.00															0.0		0.1	0.1	0.2	0.0				0.3
A 675.00													0.0		0.1	0.2	0.3	0.3	0.1	0.1				1.1
T 665.00												0.1	0.0	0.2	0.4	0.5	0.5	0.4	0.1	0.0				2.2
D 655.00										0.0	0.1	0.0	0.2	0.8	1.1	1.0	0.4	0.3	0.1					3.9
645.00										0.1	0.3	0.6	0.9	1.5	1.4	1.2	0.8	0.1	0.1					7.0
S 635.00								0.0	0.1	0.2	1.0	1.1	2.4	2.6	1.7	0.8	0.1	0.1						10.2
H 625.00							0.0	0.1	0.3	0.9	1.8	3.3	4.0	2.2	1.0	0.2	0.1							13.9
O 615.00						0.1	0.1	0.2	1.1	2.2	3.2	3.8	2.8	1.1	0.3	0.1	0.0							15.0
U 605.00					0.0	0.1	0.2	1.2	2.3	3.4	3.5	2.8	1.0	0.4										15.0
L 595.00						0.3	0.8	2.0	2.9	2.9	2.0	1.1	0.4											12.4
D 585.00				0.1	0.2	0.7	1.1	1.8	2.2	1.8	1.0	0.2	0.0											9.1
R 575.00			0.0	0.1	0.3	0.7	1.4	1.4	0.7	0.6	0.1	0.1												5.2
565.00			0.1	0.2	0.5	0.8	0.5	0.6	0.2	0.0	0.0													2.9
H 555.00		0.0	0.1	0.1	0.2	0.4	0.2	0.1	0.1															1.2
T 545.00		0.1	0.1	0.1	0.1	0.0																		0.4
535.00	0.1			0.1																				0.1
	0.1	0.1	0.2	0.6	1.3	3.1	4.4	7.4	9.9	12.2	12.9	13.2	11.7	8.8	6.0	3.9	2.3	1.2	0.5	0.2	0.	0.	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 3324.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-MID-SH'LDER HT/SIT	613.50	25.63	(0.727)*Y + (46.913)	13.74
Y-EYE HT/SITTING	778.89	29.74	(0.980)*X + (177.899)	15.94

***

CORRELATION COEFFICIENT 0.844 (BASED ON ORIGINAL DATA) 0.841 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.841	0.764	19+3303	-0.69
Y AS A FUNCTION OF X	0.841	0.990	15+3307	0.09

BIVARIATE FREQUENCY TABLE FOR
SEATD SHOULDR HT AND SEATED SHOULDER BREADTH

SEATED SHOULDER BREADTH

SEATD SHOULDR HT	374.00	384.00	394.00	404.00	414.00	424.00	434.00	444.00	454.00	464.00	474.00	484.00	494.00	504.00	514.00	524.00	534.00	TOTAL
695.00									1			1						2
685.00				1			2		1	4	2	1						11
675.00					1		1	3	5	6	6	3	3	6	2			36
665.00					2	6	2	7	14	13	10	6	9	3	1			73
655.00			1		5	4	12	14	20	19	21	18	9	5		1	2	131
645.00			2		6	17	16	34	36	44	34	18	12	9	3	1	2	234
635.00			1	6	9	21	38	57	47	56	31	26	28	15	2	2		339
625.00		1	1	8	19	27	43	88	82	8C	57	28	16	7	4			461
615.00			3	4	25	28	55	8C	95	90	56	39	14	7	1	2		499
605.00			4	11	22	35	92	9C	75	77	48	25	10	6	2	1		498
595.00		3	1	4	23	41	68	69	74	61	33	19	12	1	1		1	411
585.00			4	7	25	31	44	68	49	3C	21	12	7	2	1			301
575.00			2	5	15	26	31	31	21	23	10	7	2	1				174
565.00			2	1	12	20	20	1C	18	9	1	4						97
555.00	1		1	5	8	5	9	4	5	2	1							41
545.00				1	1	1	4	1	2	2								12
535.00							1	2	1									4
	1	4	22	53	173	262	438	558	546	516	331	207	122	62	17	7	5	3324

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-MID-SH'LDER HT/SIT	613.50	25.63	(0.311)*Y + (472.363)	24.58
Y-BIDELTOID(SHLDR)BR	454.14	23.26	(0.256)*X + (297.006)	22.32

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CORRELATION COEFFICIENT 0.282 (BASED ON ORIGINAL DATA) 0.283 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.289	0.876	15+3307	-0.23
Y AS A FUNCTION OF X	0.292	1.38C	15+3307	1.05

BIVARIATE FREQUENCY TABLE FOR
SEATD SHOULDR HT AND SEATED SHOULDER BREADTH

SEATED SHOULDER BREADTH

		374 .0C	384 .00	394 .0C	4C4 .0C	414 .00	424 .00	434 .00	444 .CC	454 .00	464 .00	474 .00	484 .00	494 .00	504 .00	514 .00	524 .00	534 .C0	TOTAL
S	695.00									0.0			0.0						0.1
E	685.00				0.C			0.1		0.0	0.1	0.1	0.0						0.3
A	675.00					0.C		0.0	C.1	0.2	0.2	0.2	0.1	0.1	0.2	0.1			1.1
T	665.00					C.1	0.2	0.1	C.2	0.4	0.4	0.3	0.2	0.3	0.1	0.0			2.2
D	655.00			0.0		0.2	0.1	0.4	0.4	0.6	0.6	C.6	0.5	C.3	0.2		C.0	0.1	3.9
	645.00			0.1		C.2	0.5	0.5	1.C	1.1	1.3	1.0	0.5	0.4	0.3	0.1	0.0	0.1	7.0
S	635.00			0.C	0.2	0.3	0.6	1.1	1.7	1.4	1.7	0.9	0.8	0.8	0.5	0.1	0.1		10.2
H	625.00		C.0	0.C	0.2	C.6	C.8	1.3	2.6	2.5	2.4	1.7	0.8	0.5	0.2	0.1			13.9
O	615.00			0.1	0.1	0.8	0.8	1.7	2.4	2.9	2.7	1.7	1.2	C.4	0.2	0.0	0.1		15.0
U	605.00			0.1	0.3	0.7	1.1	2.8	2.7	2.3	2.3	1.4	0.8	0.3	0.2	0.1	0.0		15.0
L	595.00		C.1	0.C	0.1	C.7	1.2	2.0	2.1	2.2	1.8	1.0	0.6	0.4	0.0	0.0		0.0	12.4
D	585.00			0.1	0.2	0.8	0.9	1.3	2.C	1.5	0.9	0.6	0.4	0.2	0.1	0.0			9.1
R	575.00			C.1	0.2	C.5	0.8	0.9	C.9	0.6	0.7	0.3	0.2	0.1	0.0				5.2
	565.00			0.1	0.C	C.4	0.6	0.6	C.3	0.5	0.3	0.0	0.1						2.9
H	555.00	0.C		0.0	0.2	0.2	0.2	0.3	0.1	0.2	0.1	0.0							1.2
T	545.00				0.C	C.C	0.0	0.1	C.C	0.1	0.1								0.4
	535.00							0.0	C.1	0.0									0.1
		0.C	C.1	0.7	1.6	5.2	7.9	13.2	16.8	16.4	15.5	10.0	6.2	3.7	1.9	0.5	0.2	0.2	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
CN A SAMPLE OF SIZE 3324.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-MIC-SH'LDER HT/SIT	613.50	25.63	(0.311)*Y + (472.363)	24.58
Y-BICELTOID(SHLDR)BR	454.14	23.26	(C.256)*X + (297.006)	22.32

***

CCRRELATICN COEFFICIENT C.282 (BASED ON CRIGINAL DATA) 0.283 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.289	0.876	15+3307	-0.23
Y AS A FUNCTION OF X	0.292	1.380	15+3307	1.05

BIVARIATE FREQUENCY TABLE FOR
SEATD SHOULDR HT AND SHOULDER-ELBOW LENGTH

SHOULDER-ELBOW LENGTH

	302 .50	307 .50	312 .50	317 .50	322 .5C	327 .5C	332 .5C	337 .50	342 .50	347 .50	352 .50	357 .50	362 .50	367 .50	372 .50	377 .50	382 .5C	387 .50	392 .50	397 .50	402 .50	407 .50	412 .50	417 .50	TOTAL
S 695.00												1									1				2
E 685.00										3			2	2	1	1			2						11
A 675.00									1		1	4	1	8	5	8	2	2		2	2				36
T 665.00								2	4	2	7	6	9	3	11	9	7	5	7				1		73
D 655.00								1	4	8	14	18	17	20	16	12	9	4	4	2	1	1			131
645.00						3	5	7	14	18	19	28	29	30	31	17	14	10	5	2	1		1		234
S 635.00				1	2	2	8	13	26	32	33	49	54	40	31	15	14	7	5	2	2	1	1	1	339
H 625.00		1			1	15	13	30	46	44	59	54	50	56	47	23	13	7	1	1					461
O 615.00			2		5	9	2C	33	49	67	77	72	56	47	30	17	8	5	1	1					499
U 6C5.00			2	3	1C	28	42	40	59	67	80	66	43	25	19	8	4	2							498
L 595.00		1	2	4	12	22	36	45	46	59	57	47	36	18	9	10	5	2							411
D 585.00	1	1	1	5	13	27	37	39	43	28	31	30	12	16	13	4									301
R 575.00			3	3	9	15	21	21	27	26	22	17	2	2	5			1							174
565.00		2	4	2	1C	15	12	13	14	8	8	4	3		1		1								97
H 555.00		1	1	3	3	4	8	10	4	3	1		2	1											41
T 545.00	1			2	2	3	1	1	2																12
535.00				1		3																			4
	2	6	15	24	67	146	203	255	339	365	4C9	396	316	268	219	124	77	45	25	10	7	2	3	1	3324

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-MIC-SH'LDER HT/SIT	613.50	25.63	(C.778)*Y + (338.259)	22.25
Y-SHCULDER-ELBOW LTH	353.82	16.35	(C.317)*X + (159.587)	14.19

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CORRELATICN COEFFICIENT C.496 (BASED ON CRIGINAL DATA) 0.497 (BASED ON GROUPED DATA)

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LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.500	0.681	22+3300	-1.09
Y AS A FUNCTION OF X	0.500	1.044	15+3307	0.24

BIVARIATE FREQUENCY TABLE FOR
SEATD SHOULDR HT AND SHOULDER-ELBOW LENGTH

SHOULDER-ELBOW LENGTH

		302.50	307.50	312.50	317.50	322.50	327.50	332.50	337.50	342.50	347.50	352.50	357.50	362.50	367.50	372.50	377.50	382.50	387.50	392.50	397.50	402.50	407.50	412.50	417.50	TOTAL
S	695.00												0.0									0.0				0.1
E	685.00										0.1			0.1	0.1	0.0	0.0			0.1						0.3
A	675.00									0.0		0.0	0.1	0.0	0.2	0.2	0.2	0.1	0.1		0.1	0.1				1.1
T	665.00								0.1	0.1	0.1	0.2	0.2	0.3	0.1	0.3	0.3	0.2	0.2	0.2				0.0		2.2
D	655.00								0.0	0.1	0.2	0.4	0.5	0.5	0.6	0.5	0.4	0.3	0.1	0.1	0.1	0.0	0.0			3.9
	645.00						0.1	0.2	0.2	0.4	0.5	0.6	0.8	0.9	0.9	0.9	0.5	0.4	0.3	0.2	0.1	0.0		0.0		7.0
S	635.00				0.0	0.1	0.1	0.2	0.4	0.8	1.0	1.0	1.5	1.6	1.2	0.9	0.5	0.4	0.2	0.2	0.1	0.1	0.0	0.0	0.0	10.2
H	625.00		0.0			0.0	0.5	0.4	0.9	1.4	1.3	1.8	1.6	1.5	1.7	1.4	0.7	0.4	0.2	0.0	0.0					13.9
O	615.00			0.1		0.2	0.3	0.6	1.0	1.5	2.0	2.3	2.2	1.7	1.4	0.9	0.5	0.2	0.2	0.0	0.0					15.0
U	605.00			0.1	0.1	0.3	0.8	1.3	1.2	1.8	2.0	2.4	2.0	1.3	0.8	0.6	0.2	0.1	0.1							15.0
L	595.00		0.0	0.1	0.1	0.4	0.7	1.1	1.4	1.4	1.8	1.7	1.4	1.1	0.5	0.3	0.3	0.2	0.1							12.4
D	585.00	0.0	0.0	0.0	0.2	0.4	0.8	1.1	1.2	1.3	0.8	0.9	0.9	0.4	0.5	0.4	0.1									9.1
R	575.00			0.1	0.1	0.3	0.5	0.6	0.6	0.8	0.8	0.7	0.5	0.1	0.1	0.2			0.0							5.2
	565.00		0.1	0.1	0.1	0.3	0.5	0.4	0.4	0.4	0.2	0.2	0.1	0.1		0.0		0.0								2.9
H	555.00		0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.1	0.1	0 0		0.1	0.0											1.2
T	545.00	0.0			0.1	0.1	0.1	0.0	0.0	0.1																0.4
	535.00				0.0		0.1																			0.1
		0.1	0.2	0.5	0.7	2.0	4.4	6.1	7.7	10.2	11.0	12.3	11.9	9.5	8.1	6.6	3.7	2.3	1.4	0.8	0.3	0.2	0.1	0.1	0.0	100.0

VALUES IN THE TABLE ARE PERCENTAGES BASED
ON A SAMPLE OF SIZE 3324.

SUMMARY STATISTICS

	MEAN	STD DEV	REGRESSION EQUATIONS	SE-EST
X-MID-SH'LDER HT/SIT	613.50	25.63	(0.778)*Y + (338.259)	22.25
Y-SHOULDER-ELBOW LTH	353.82	16.35	(0.317)*X + (159.587)	14.19

***

CORRELATION COEFFICIENT 0.496 (BASED ON ORIGINAL DATA) 0.497 (BASED ON GROUPED DATA)

***

LINEARITY OF REGRESSION CHECK	ETA	F	D OF F	C.R.
X AS A FUNCTION OF Y	0.500	0.681	22+3300	-1.09
Y AS A FUNCTION OF X	0.500	1.044	15+3307	0.24

BIVARIANT DATA OF THE 1964 NAVAL AVIATOR'S SURVEY

CORRELATION TABLE

FORWARD ARM REACH AND SITTING HEIGHT

ENTRIES REPRESENT PERCENTAGES OF 1549 SUBJECTS.

FORWARD ARM REACH

SITTING HEIGHT	27.1 27.7	27.7 28.3	28.3 28.9	28.9 29.5	29.5 30.0	30.0 30.6	30.6 31.2	31.2 31.8	31.8 32.4	32.4 33.0	33.0 33.6	33.6 34.2	34.2 34.7	34.7 35.3	35.3 35.9	35.9 36.5	TOTAL
32.0 TO 32.6	0.000	0.000	.065	0.000	.129	0.000	0.000	.065	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.323
32.6 TO 33.2	0.000	0.000	0.000	0.000	.194	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.258
33.2 TO 33.8	0.000	0.000	.065	.065	.452	.194	.194	.258	.065	.065	0.000	0.000	0.000	0.000	0.000	0.000	1.356
33.8 TO 34.4	0.000	0.000	.452	.710	.710	.775	1.162	.516	.452	.194	.258	.065	0.000	.065	0.000	0.000	5.358
34.4 TO 35.0	0.000	.065	.129	.968	.904	1.291	1.679	.968	.839	.323	.387	.194	.194	0.000	0.000	0.000	7.991
35.0 TO 35.6	0.000	.065	.258	.904	2.130	2.647	3.228	2.130	1.356	.968	.387	.065	.129	.129	.065	0.000	14.461
35.6 TO 36.2	.065	.129	.323	.646	1.743	2.841	4.390	2.389	2.711	1.872	1.549	.387	.387	.065	0.000	0.000	19.496
36.2 TO 36.8	0.000	.065	.194	.581	1.162	1.743	2.970	3.422	2.324	1.937	1.743	.710	.323	.387	0.000	.065	17.624
36.8 TO 37.4	0.000	0.000	.065	.258	1.033	1.485	3.357	2.582	2.389	2.389	1.291	.710	.452	.258	.129	0.000	16.398
37.4 TO 38.0	0.000	0.000	.065	.065	.258	.710	.904	1.420	1.614	1.485	1.356	.646	.323	.194	0.000	.065	9.103
38.0 TO 38.6	0.000	0.000	0.000	.065	0.000	.194	.387	.581	.839	.646	.387	.323	.452	.258	.129	.065	4.325
38.6 TO 39.2	0.000	0.000	0.000	0.000	0.000	.129	.387	.129	.646	.258	.258	.323	.065	0.000	0.000	.065	2.260
39.2 TO 39.8	0.000	0.000	0.000	0.000	.065	0.000	.065	.129	.065	.065	.194	0.000	.129	0.000	0.000	0.000	.710
39.8 TO 40.4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	0.000	0.000	.194	0.000	0.000	0.000	0.000	.258
40.4 TO 41.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	0.000	0.000	0.000	.065
41.0 TO 41.6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	0.000	0.000	0.000	.065
TOTAL -	.065	.323	1.614	4.261	8.780	12.072	18.722	14.655	13.363	10.200	7.811	3.744	2.453	1.356	.323	.258	100.0

MEASUREMENTS ARE IN INCHES

MEASUREMENT TYPE	MEAN	STANDARD DEVIATION	RANGE	HIGH	LOW	PERCENTILE LEVELS 1	5	50	95	99
FORWARD ARM REACH	31.51	1.421	8.8	36.2	27.4	28.6	29.3	31.4	34.0	35.0
SITTING HEIGHT	36.28	1.246	9.0	41.3	32.3	33.4	34.2	36.2	38.3	39.4

CORRELATION R = .377
Y = 25.864+(.330X)
X = 15.925+(.430Y)

CORRELATION TABLE

FORWARD ARM REACH AND STANDING HEIGHT

ENTRIES REPRESENT PERCENTAGES OF 1549 SUBJECTS.

FORWARD ARM REACH

STANDING HEIGHT	27.1 27.7	27.7 28.3	28.3 28.9	28.9 29.5	29.5 30.0	30.0 30.6	30.6 31.2	31.2 31.8	31.8 32.4	32.4 33.0	33.0 33.6	33.6 34.2	34.2 34.7	34.7 35.3	35.3 35.9	35.9 36.5	TOTAL
63.0 TO 64.0	0.000	.065	.065	0.000	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.194
64.0 TO 64.9	0.000	0.000	.194	.065	.129	.129	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.516
64.9 TO 65.8	0.000	0.000	.516	.516	.516	.258	.194	0.000	.129	.129	0.000	0.000	0.000	0.000	0.000	0.000	2.260
65.8 TO 66.7	0.000	.065	.258	1.162	1.162	1.033	.839	.581	.065	0.000	0.000	0.000	0.000	.065	0.000	0.000	5.229
66.7 TO 67.6	0.000	.065	.129	.968	1.937	1.614	1.291	.839	.387	.129	0.000	0.000	0.000	0.000	0.000	0.000	7.360
67.6 TO 68.5	.065	.129	.194	.968	2.389	2.647	3.744	1.679	.968	.258	.194	.065	0.000	0.000	0.000	0.000	13.299
68.5 TO 69.4	0.000	0.000	.065	.387	1.162	2.453	4.325	1.937	1.679	.710	.323	0.000	.194	0.000	0.000	0.000	13.234
69.4 TO 70.3	0.000	0.000	.129	.129	.710	2.130	3.551	3.228	2.518	1.291	1.291	.194	.129	0.000	0.000	0.000	15.300
70.3 TO 71.2	0.000	0.000	0.000	.065	.516	1.097	2.582	2.582	2.389	2.130	1.420	.323	.258	.129	0.000	0.000	13.493
71.2 TO 72.1	0.000	0.000	0.000	0.000	.194	.516	1.420	1.937	2.260	2.001	1.356	.775	.258	.258	.065	.065	11.104
72.1 TO 73.0	0.000	0.000	.065	0.000	0.000	.194	.581	.904	1.479	1.162	1.485	.710	.387	.194	.129	.065	7.553
73.0 TO 73.9	0.000	0.000	0.000	0.000	0.000	0.000	.065	.581	.904	1.356	.968	.839	.452	.323	0.000	0.000	5.487
73.9 TO 74.9	0.000	0.000	0.000	0.000	0.000	0.000	.129	.323	.323	.904	.516	.581	.452	.129	.129	.065	3.551
74.9 TO 75.8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	.065	.129	.194	0.000	.194	.258	0.000	0.000	.904
75.8 TO 76.7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	.258	.065	0.000	0.000	.065	.452
76.7 TO 77.6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	0.000	0.000	.065
TOTAL	.065	.323	1.614	4.261	8.780	12.072	18.722	14.655	13.363	10.200	7.811	3.744	2.453	1.356	.323	.258	100.0

MEASUREMENTS ARE IN INCHES

MEASUREMENT TYPE	MEAN	STANDARD DEVIATION	RANGE	HIGH	LOW	PERCENTILE LEVELS 1	5	50	95	99
FORWARD ARM REACH	31.51	1.421	8.8	36.2	27.4	28.6	29.3	31.4	34.0	35.0
STANDING HEIGHT	69.94	2.328	13.6	77.1	63.5	65.2	66.2	69.9	73.9	75.3

CORRELATION R = .673
Y = 35.201+(1.103X)
X = 2.797+(.411Y)

CORRELATION TABLE

FORWARD ARM REACH AND SITTING SHOULDER HEIGHT

ENTRIES REPRESENT PERCENTAGES OF 1549 SUBJECTS.

FORWARD ARM REACH

SITTING SHOULDER HEIGHT	27.1 27.7	27.7 28.3	28.3 28.9	28.9 29.5	29.5 30.0	30.0 30.6	30.6 31.2	31.2 31.8	31.8 32.4	32.4 33.0	33.0 33.6	33.6 34.2	34.2 34.7	34.7 35.3	35.3 35.9	35.9 36.5	TOTAL
19.8 TO 20.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065
20.3 TO 20.8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20.8 TO 21.3	0.000	0.000	.129	.065	.129	.065	.065	0.000	0.000	.065	0.000	0.000	0.000	0.000	0.000	0.000	.516
21.3 TO 21.7	0.000	0.000	.129	.129	.323	.323	0.000	.194	.452	.129	.194	0.000	0.000	0.000	0.000	0.000	1.872
21.7 TO 22.2	0.000	0.000	.129	.646	.646	.839	.775	.581	.323	.323	.065	.129	0.000	0.000	0.000	0.000	4.454
22.2 TO 22.7	0.000	.065	.387	.904	1.033	1.033	2.776	1.097	.904	.968	.387	.258	.194	.065	0.000	0.000	10.071
22.7 TO 23.2	0.000	.129	.323	.452	1.614	1.808	3.034	1.679	1.414	.968	.516	.258	.194	.323	.065	0.000	12.976
23.2 TO 23.7	0.000	.065	.129	.839	1.872	2.647	2.711	1.549	1.408	1.420	1.420	.387	.129	.129	.065	0.000	15.171
23.7 TO 24.2	.065	.065	.258	.581	1.743	2.324	3.292	3.422	2.130	1.743	1.743	.775	.323	.194	0.000	.129	18.786
24.2 TO 24.7	0.000	0.000	.065	.452	.646	1.743	2.389	2.841	2.130	2.001	1.485	.646	.710	.194	.129	.065	15.494
24.7 TO 25.2	0.000	0.000	0.000	.194	.258	.775	2.582	2.001	2.260	1.097	.968	.516	.516	.387	0.000	0.000	11.556
25.2 TO 25.7	0.000	0.000	.065	0.000	.387	.258	.839	.516	.968	.839	.387	.258	.129	.065	0.000	0.000	4.713
25.7 TO 26.1	0.000	0.000	0.000	0.000	.065	.129	.194	.646	.387	.452	.323	.323	.194	0.000	.065	0.000	2.776
26.1 TO 26.6	0.000	0.000	0.000	0.000	.065	.065	.065	0.000	.258	.129	.323	.065	0.000	0.000	0.000	0.000	.968
26.6 TO 27.1	0.000	0.000	0.000	0.000	0.000	.065	0.000	.065	.129	0.000	0.000	.065	.065	0.000	0.000	.065	.452
27.1 TO 27.6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	.065	0.000	0.000	0.000	0.000	.129
TOTAL	.065	.323	1.614	4.261	8.780	12.072	18.722	14.655	13.363	10.200	7.811	3.744	2.453	1.356	.323	.258	100.0

MEASUREMENTS ARE IN INCHES

MEASUREMENT TYPE	MEAN	STANDARD DEVIATION	RANGE	HIGH	LOW	PERCENTILE LEVELS 1	5	50	95	99
FORWARD ARM REACH	31.51	1.421	8.8	36.2	27.4	28.6	29.3	31.4	34.0	35.0
SITTING SHOULDER HEIGHT	23.80	1.063	7.3	27.4	20.0	21.5	22.0	23.8	25.5	26.4

CORRELATION R = .285

Y = 17.084+(.213X)

X = 22.454+(.381Y)

CORRELATION TABLE

FORWARD ARM REACH AND BUTTOCK TO KNEE LENGTH

ENTRIES REPRESENT PERCENTAGES OF 1549 SUBJECTS.

FORWARD ARM REACH

BUTTOCK TO KNEE LENGTH	27.1 27.7	27.7 28.3	28.3 28.9	28.9 29.5	29.5 30.0	30.0 30.6	30.6 31.2	31.2 31.8	31.8 32.4	32.4 33.0	33.0 33.6	33.6 34.2	34.2 34.7	34.7 35.3	35.3 35.9	35.9 36.5	TOTAL
20.5 TO 21.0	0.000	0.000	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065
21.0 TO 21.4	0.000	.065	.065	0.000	0.000	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.194
21.4 TO 21.9	0.000	0.000	.258	.194	.129	.387	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.033
21.9 TO 22.4	.065	0.000	.194	.387	.452	.194	.258	.129	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.743
22.4 TO 22.8	0.000	.065	.452	.968	1.485	1.485	1.227	.581	.323	.065	.065	0.000	0.000	0.000	0.000	0.000	6.714
22.8 TO 23.3	0.000	.129	.258	1.291	1.743	2.260	3.228	1.033	.710	.323	.258	.065	.065	0.000	0.000	0.000	11.362
23.3 TO 23.7	0.000	.065	.194	1.033	2.647	2.324	3.357	2.130	1.937	.775	.387	.065	.129	0.000	0.000	0.000	15.042
23.7 TO 24.2	0.000	0.000	.065	.387	1.420	2.841	4.325	3.422	2.647	1.872	1.485	.775	.129	.194	0.000	0.000	19.561
24.2 TO 24.7	0.000	0.000	0.000	0.000	.646	1.356	3.680	3.486	2.711	2.260	1.291	.516	.452	.323	.065	.065	16.850
24.7 TO 25.1	0.000	0.000	0.000	0.000	.065	.646	1.356	1.614	2.453	1.808	1.937	.646	.323	.194	.065	.065	11.168
25.1 TO 25.6	0.000	0.000	0.000	0.000	.065	.452	.581	1.485	1.549	1.679	1.162	.710	.516	.194	.129	0.000	8.522
25.6 TO 26.0	0.000	0.000	.065	0.000	.065	.065	.646	.710	.839	.452	.646	.516	.387	.258	.065	.129	4.842
26.0 TO 26.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	.065	.839	.387	.258	.065	.129	0.000	0.000	1.808
26.5 TO 27.0	0.000	0.000	0.000	0.000	.065	0.000	0.000	0.000	.065	.129	.194	.129	.129	.065	0.000	0.000	.775
27.0 TO 27.4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	.194	0.000	0.000	0.000	.258
27.4 TO 27.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	0.000	0.000	.065
TOTAL	.065	.323	1.614	4.261	8.780	12.072	18.722	14.655	13.363	10.200	7.611	3.744	2.453	1.356	.323	.258	100.0

MEASUREMENTS ARE IN INCHES

MEASUREMENT TYPE	MEAN	STANDARD DEVIATION	RANGE	HIGH	LOW	PERCENTILE LEVELS 1	5	50	95	99
FORWARD ARM REACH	31.51	1.421	8.8	36.2	27.4	28.6	29.3	31.4	34.0	35.0
BUTTOCK TO KNEE LENGTH	24.09	.999	6.9	27.6	20.7	21.8	22.5	24.0	25.8	26.5

CORRELATION R = .586
Y = 11.110+(.412X)
X = 11.414+(.834Y)

CORRELATION TABLE

FORWARD ARM REACH AND SITTING EYE HEIGHT

ENTRIES REPRESENT PERCENTAGES OF 1549 SUBJECTS.

FORWARD ARM REACH

SITTING EYE HEIGHT	27.1 27.7	27.7 28.3	28.3 28.9	28.9 29.5	29.5 30.0	30.0 30.6	30.6 31.2	31.2 31.8	31.8 32.4	32.4 33.0	33.0 33.6	33.6 34.2	34.2 34.7	34.7 35.3	35.3 35.9	35.9 36.5	TOTAL
27.8 TO 28.3	0.000	0.000	.065	0.000	.065	0.000	0.000	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.194
28.3 TO 28.8	0.000	0.000	0.000	0.000	.258	.258	.129	.065	.065	.065	0.000	0.000	0.000	0.000	0.000	0.000	.839
28.8 TO 29.3	0.000	0.000	.129	.194	.452	.452	.129	.194	.194	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.743
29.3 TO 29.8	0.000	0.000	0.000	.387	.387	.710	.775	.387	.452	.194	0.000	.129	0.000	0.000	0.000	0.000	3.422
29.8 TO 30.3	0.000	0.000	.516	.775	1.227	1.227	1.614	1.097	.646	.646	.258	0.000	.194	.065	0.000	0.000	8.263
30.3 TO 30.8	0.000	.194	.065	1.033	1.679	1.356	3.099	1.872	1.420	.775	.839	.387	.129	.129	.065	0.000	13.041
30.8 TO 31.3	.065	.065	.452	.516	1.743	2.518	3.099	2.518	2.001	1.227	1.549	.387	.194	.129	0.000	0.000	15.462
31.3 TO 31.8	0.000	.065	.194	.646	.968	2.324	3.809	2.582	1.872	1.808	1.162	.194	.387	.129	0.000	0.000	16.139
31.8 TO 32.4	0.000	0.000	.129	.387	1.097	1.679	2.841	2.453	2.324	1.614	1.033	.387	.323	.129	0.000	.065	14.461
32.4 TO 32.9	0.000	0.000	.065	.194	.710	.775	1.937	1.614	1.808	1.743	1.485	.839	.323	.387	.129	.065	12.072
32.9 TO 33.4	0.000	0.000	0.000	.129	.065	.452	.452	.968	1.162	1.162	.646	.387	.387	.323	.065	0.000	6.198
33.4 TO 33.9	0.000	0.000	0.000	0.000	.065	.129	.452	.323	.839	.710	.516	.387	.323	.065	.065	.065	3.938
33.9 TO 34.4	0.000	0.000	0.000	0.000	0.000	.129	.323	.387	.323	.129	.129	.194	.129	0.000	0.000	.065	1.808
34.4 TO 34.9	0.000	0.000	0.000	0.000	.065	.065	.065	0.000	.258	.129	.065	.258	.065	0.000	0.000	0.000	.968
34.9 TO 35.4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.129	0.000	0.000	.129	.129	0.000	0.000	0.000	0.000	.387
35.4 TO 35.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	0.000	0.000	0.000	.065
TOTAL	.065	.323	1.614	4.261	8.780	12.072	18.722	14.655	13.363	10.200	7.811	3.744	2.453	1.356	.323	.258	100.0

MEASUREMENTS ARE IN INCHES

MEASUREMENT TYPE	MEAN	STANDARD DEVIATION	RANGE	HIGH	LOW	PERCENTILE LEVELS 1	5	50	95	99
FORWARD ARM REACH	31.51	1.421	8.8	36.2	27.4	28.6	29.3	31.4	34.0	35.0
SITTING EYE HEIGHT	31.57	1.185	7.6	35.6	28.1	28.8	29.7	31.5	33.6	34.5

CORRELATION R = .358
Y = 22.160+(.299X)
X = 17.955+(.429Y)

CORRELATION TABLE

BUTTOCK TO KNEE LENGTH AND SITTING SHOULDER HEIGHT

ENTRIES REPRESENT PERCENTAGES OF 1549 SUBJECTS.

BUTTOCK TO KNEE LENGTH

SITTING SHOULDER HEIGHT	20.5 21.0	21.0 21.4	21.4 21.9	21.9 22.4	22.4 22.8	22.8 23.3	23.3 23.7	23.7 24.2	24.2 24.7	24.7 25.1	25.1 25.6	25.6 26.0	26.0 26.5	26.5 27.0	27.0 27.4	27.4 27.9	TOTAL
19.8 TO 20.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065
20.3 TO 20.8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20.8 TO 21.3	0.000	.065	0.000	0.000	0.000	.323	.065	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.516
21.3 TO 21.7	0.000	0.000	.065	0.000	.258	.194	.452	.581	.258	0.000	.065	0.000	0.000	0.000	0.000	0.000	1.872
21.7 TO 22.2	0.000	.065	.387	.129	.516	1.356	.646	.516	.452	.194	.194	0.000	0.000	0.000	0.000	0.000	4.454
22.2 TO 22.7	0.000	0.000	.129	.258	1.227	2.195	1.937	1.679	1.291	.904	.194	.258	0.000	0.000	0.000	0.000	10.071
22.7 TO 23.2	0.000	0.000	.129	.452	1.162	2.130	2.453	2.647	2.130	.904	.452	.452	0.000	.065	0.000	0.000	12.976
23.2 TO 23.7	0.000	.065	.323	.194	1.097	1.549	2.711	3.615	2.711	1.227	1.291	.258	.129	0.000	0.000	0.000	15.171
23.7 TO 24.2	.065	0.000	0.000	.387	1.227	2.130	2.518	3.809	3.480	2.195	1.679	.646	.323	.129	0.000	0.000	18.785
24.2 TO 24.7	0.000	0.000	0.000	.258	.775	.710	2.066	3.099	3.034	1.937	1.614	1.420	.258	.194	.129	0.000	15.494
24.7 TO 25.2	0.000	0.000	0.000	0.000	.387	.710	1.549	1.937	1.479	2.260	1.356	.710	.646	.258	.065	0.000	11.555
25.2 TO 25.7	0.000	0.000	0.000	0.000	.065	.065	.452	.775	.839	.904	.839	.516	.129	.065	.065	0.000	4.713
25.7 TO 26.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.516	.581	.387	.646	.387	.194	0.000	0.000	.065	2.776
26.1 TO 26.6	0.000	0.000	0.000	.065	0.000	0.000	.129	.065	.129	.194	.065	.129	.129	.065	0.000	0.000	.968
26.6 TO 27.1	0.000	0.000	0.000	0.000	0.000	0.000	.065	.194	0.000	0.000	.129	.065	0.000	0.000	0.000	0.000	.452
27.1 TO 27.6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	.065	0.000	0.000	0.000	0.000	0.000	0.000	.129
TOTAL	.065	.194	1.033	1.743	6.714	11.362	15.042	19.561	16.850	11.168	8.522	4.842	1.808	.775	.258	.065	100.0

MEASUREMENTS ARE IN INCHES

MEASUREMENT TYPE	MEAN	STANDARD DEVIATION	RANGE	HIGH	LOW	PERCENTILE LEVELS 1	5	50	95	99
BUTTOCK TO KNEE LENGTH	24.09	.999	6.9	27.6	20.7	21.8	22.5	24.0	25.8	26.5
SITTING SHOULDER HEIGHT	23.80	1.063	7.3	27.4	20.0	21.5	22.0	23.8	25.5	26.4

CORRELATION R = .400

Y = 13.535+(.426X)

X = 15.149+(.376Y)

CORRELATION TABLE

BUTTOCK TO KNEE LENGTH AND KNEE HEIGHT

ENTRIES REPRESENT PERCENTAGES OF 1549 SUBJECTS.

BUTTOCK TO KNEE LENGTH

KNEE HEIGHT	20.5 21.0	21.0 21.4	21.4 21.9	21.9 22.4	22.4 22.8	22.8 23.3	23.3 23.7	23.7 24.2	24.2 24.7	24.7 25.1	25.1 25.6	25.6 26.0	26.0 26.5	26.5 27.0	27.0 27.4	27.4 27.9	TOTAL
18.8 TO 19.2	.065	0.000	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.129
19.2 TO 19.6	0.000	0.000	.129	0.000	.129	.194	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.516
19.6 TO 20.0	0.000	.129	.323	.129	.710	.452	.065	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.872
20.0 TO 20.4	0.000	.065	.387	.581	1.097	1.872	.968	.258	0.000	.065	0.000	0.000	0.000	0.000	0.000	0.000	5.294
20.4 TO 20.8	0.000	0.000	.065	.452	1.743	2.389	1.549	1.227	.387	.065	0.000	.065	0.000	0.000	0.000	0.000	7.941
20.8 TO 21.2	0.000	0.000	0.000	.387	1.872	2.582	3.551	2.776	1.227	.194	.065	0.000	0.000	0.000	0.000	0.000	12.653
21.2 TO 21.6	0.000	0.000	.065	.129	.452	2.195	4.261	4.842	2.582	.323	.129	0.000	0.000	0.000	0.000	0.000	14.977
21.6 TO 22.0	0.000	0.000	0.000	.065	.581	1.356	2.195	4.777	3.357	1.743	.646	.129	.129	.065	0.000	0.000	15.042
22.0 TO 22.5	0.000	0.000	0.000	0.000	.129	.194	1.679	3.551	4.519	2.776	1.162	.452	0.000	0.000	0.000	0.000	14.461
22.5 TO 22.9	0.000	0.000	0.000	0.000	0.000	.065	.452	1.420	3.228	3.357	2.389	.968	.194	.065	0.000	0.000	12.137
22.9 TO 23.3	0.000	0.000	0.000	0.000	0.000	.065	.129	.581	1.097	1.485	2.195	1.485	.194	.065	0.000	0.000	7.295
23.3 TO 23.7	0.000	0.000	0.000	0.000	0.000	0.000	.065	.065	.452	.775	1.227	1.033	.452	.258	.065	0.000	4.390
23.7 TO 24.1	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	0.000	.387	.387	.387	.646	0.000	0.000	.065	1.937
24.1 TO 24.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.323	.323	.194	.194	.129	0.000	1.162
24.5 TO 24.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.129	0.000	0.000	.129
24.9 TO 25.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	.065
TOTAL	.065	.194	1.033	1.743	6.714	11.362	15.042	19.561	16.450	11.168	8.522	4.842	1.808	.775	.258	.065	100.0

MEASUREMENTS ARE IN INCHES

MEASUREMENT TYPE	MEAN	STANDARD DEVIATION	RANGE	HIGH	LOW	PERCENTILE LEVELS 1	5	50	95	99
BUTTOCK TO KNEE LENGTH	24.09	.999	6.9	27.6	20.7	21.8	22.5	24.0	25.7	26.5
KNEE HEIGHT	21.84	.977	6.1	25.1	19.0	19.7	20.3	21.8	23.5	24.2

CORRELATION R = .785
Y = 3.336+(.768X)
X = 6.570+(.[illegible]2Y)

CORRELATION TABLE

BUTTOCK TO KNEE LENGTH AND SITTING EYE HEIGHT

ENTRIES REPRESENT PERCENTAGES OF 1549 SUBJECTS.

BUTTOCK TO KNEE LENGTH

SITTING EYE HEIGHT	20.5 21.0	21.0 21.4	21.4 21.9	21.9 22.4	22.4 22.8	22.8 23.3	23.3 23.7	23.7 24.2	24.2 24.7	24.7 25.1	25.1 25.6	25.6 26.0	26.0 26.5	26.5 27.0	27.0 27.4	27.4 27.9	TOTAL
27.8 TO 28.3	0.000	0.000	0.000	0.000	.065	.129	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.194
28.3 TO 28.8	0.000	0.000	.065	0.000	0.000	.581	.065	.129	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.839
28.8 TO 29.3	0.000	.065	0.000	.258	.194	.258	.323	.387	.129	.065	0.000	.065	0.000	0.000	0.000	0.000	1.743
29.3 TO 29.8	0.000	0.000	.065	.065	.387	.710	.775	.581	.516	.194	.129	0.000	0.000	0.000	0.000	0.000	3.422
29.8 TO 30.3	0.000	.065	.129	.194	1.097	1.485	1.679	1.614	1.291	.129	.452	.129	0.000	0.000	0.000	0.000	8.263
30.3 TO 30.8	0.000	.065	.516	.387	1.227	2.389	1.743	2.324	1.672	1.097	.775	.516	.065	.065	0.000	0.000	13.041
30.8 TO 31.3	0.000	0.000	.194	.387	1.485	1.743	3.357	3.809	2.518	1.485	.839	.516	0.000	.129	0.000	0.000	16.462
31.3 TO 31.8	0.000	0.000	0.000	.065	1.162	1.549	2.776	3.099	3.228	1.614	1.356	.775	.387	.065	.065	0.000	16.139
31.8 TO 32.4	0.000	0.000	.065	.065	.646	1.549	2.130	2.711	2.711	2.453	1.162	.581	.258	.129	0.000	0.000	14.461
32.4 TO 32.9	.065	0.000	0.000	.194	.258	.775	1.291	2.582	2.582	1.937	1.162	.581	.387	.194	.065	0.000	12.072
32.9 TO 33.4	0.000	0.000	0.000	.129	.065	.194	.323	1.227	.839	1.033	1.227	.710	.258	.065	.065	.065	6.198
33.4 TO 33.9	0.000	0.000	0.000	0.000	.129	0.000	.323	.516	.516	.710	.710	.710	.194	.065	.065	0.000	3.938
33.9 TO 34.4	0.000	0.000	0.000	0.000	0.000	0.000	.129	.194	.416	.258	.452	.129	.129	0.000	0.000	0.000	1.808
34.4 TO 34.9	0.000	0.000	0.000	0.000	0.000	0.000	.129	.258	.065	.194	.194	.065	.065	0.000	0.000	0.000	.968
34.9 TO 35.4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.129	0.000	0.000	.065	.065	.065	.065	0.000	0.000	.387
35.4 TO 35.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065
TOTAL	.065	.194	1.033	1.743	6.714	11.362	15.042	19.561	16.850	11.168	8.522	4.842	1.808	.775	.258	.065	100.0

MEASUREMENTS ARE IN INCHES

MEASUREMENT TYPE	MEAN	STANDARD DEVIATION	RANGE	HIGH	LOW	PERCENTILE LEVELS 1	5	50	95	99
BUTTOCK TO KNEE LENGTH	24.09	.999	6.9	27.6	20.7	21.0	22.5	24.0	25.8	26.5
SITTING EYE HEIGHT	31.57	1.185	7.6	35.6	28.1	28.8	29.7	31.5	33.6	34.5

CORRELATION R = .392
Y = 20.349+(.446X)
X = 13.651+(.331Y)

CORRELATION TABLE

STANDING HEIGHT AND SITTING HEIGHT

ENTRIES REPRESENT PERCENTAGES OF 1549 SUBJECTS.

STANDING HEIGHT

SITTING HEIGHT	63.0 64.0	64.0 64.9	64.9 65.8	65.8 66.7	66.7 67.6	67.6 68.5	68.5 69.4	69.4 70.3	70.3 71.2	71.2 72.1	72.1 73.0	73.0 73.9	73.9 74.9	74.9 75.8	75.8 76.7	76.7 77.6	TOTAL
32.0 TO 32.6	0.000	.129	.065	.065	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.323
32.6 TO 33.2	.065	.065	.129	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.258
33.2 TO 33.8	.065	.065	.323	.516	.129	.258	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.356
33.8 TO 34.4	0.000	.194	.968	1.291	.968	.904	.581	.387	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.358
34.4 TO 35.0	0.000	.065	.452	1.549	1.679	1.291	1.420	1.033	.323	.129	0.000	0.000	0.000	0.000	0.000	0.000	7.941
35.0 TO 35.6	0.000	0.000	.258	1.291	2.066	4.519	2.647	2.130	1.097	.258	.065	.065	.065	0.000	0.000	0.000	14.461
35.6 TO 36.2	.065	0.000	.065	.387	1.614	4.132	4.132	4.261	2.389	1.549	.839	0.000	.065	0.000	0.000	0.000	19.476
36.2 TO 36.8	0.000	0.000	0.000	.129	.775	1.614	2.389	3.680	4.132	3.099	.904	.646	.258	0.000	0.000	0.000	17.624
36.8 TO 37.4	0.000	0.000	0.000	0.000	0.000	.452	1.614	3.163	3.551	3.357	2.324	1.356	.516	.065	0.000	0.000	16.398
37.4 TO 38.0	0.000	0.000	0.000	0.000	.065	.065	.452	.516	1.485	1.808	1.679	1.937	.839	.194	.065	0.000	9.103
38.0 TO 38.6	0.000	0.000	0.000	0.000	0.000	.065	0.000	.129	.258	.581	1.162	.839	.968	.258	.065	0.000	4.325
38.6 TO 39.2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.129	.323	.516	.387	.452	.258	.194	0.000	2.260
39.2 TO 39.8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	.065	.065	.323	.065	.065	.065	.710
39.8 TO 40.4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.129	.065	.065	0.000	0.000	.258
40.4 TO 41.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	0.000	0.000	0.000	.065
41.0 TO 41.6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	.065
TOTAL	.194	.516	2.260	5.229	7.360	13.299	13.234	15.300	13.493	11.104	7.553	5.487	3.551	.904	.452	.065	100.0

MEASUREMENTS ARE IN INCHES

MEASUREMENT TYPE	MEAN	STANDARD DEVIATION	RANGE	HIGH	LOW	PERCENTILE LEVELS 1	5	50	95	99
STANDING HEIGHT	69.94	2.328	13.6	77.1	63.5	65.2	66.2	69.9	73.9	75.3
SITTING HEIGHT	36.28	1.246	9.0	41.3	32.3	33.4	34.2	36.2	38.3	39.4

CORRELATION R = .760
Y = 7.838+(.407X)
X = 18.446+(1.419Y)

CORRELATION TABLE

STANDING HEIGHT AND BUTTOCK TO KNEE LENGTH

ENTRIES REPRESENT PERCENTAGES OF 1549 SUBJECTS.

STANDING HEIGHT

BUTTOCK TO KNEE LENGTH	63.0 64.0	64.0 64.9	64.9 65.8	65.8 66.7	66.7 67.6	67.6 68.5	68.5 69.4	69.4 70.3	70.3 71.2	71.2 72.1	72.1 73.0	73.0 73.9	73.9 74.9	74.9 75.8	75.8 ~~76.7~~	76.7 ~~77.6~~	TOTAL
20.5 TO 21.0	0.000	0.000	0.000	0.000	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065
21.0 TO 21.4	.129	0.000	0.000	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.194
21.4 TO 21.9	0.000	.129	.452	.387	0.000	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.033
21.9 TO 22.4	.065	0.000	.387	.323	.387	.387	.129	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.743
22.4 TO 22.8	0.000	.129	.323	1.808	1.485	1.937	.581	.387	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.714
22.8 TO 23.3	0.000	.258	1.033	1.485	2.195	2.905	2.001	.839	.516	.129	0.000	0.000	0.000	0.000	0.000	0.000	11.362
23.3 TO 23.7	0.000	0.000	.065	.710	2.260	3.551	2.841	3.292	1.356	.839	.065	.065	0.000	0.000	0.000	0.000	15.042
23.7 TO 24.2	0.000	0.000	0.000	.387	.710	3.099	4.325	4.067	3.744	2.001	.646	.515	.065	0.000	0.000	0.000	19.561
24.2 TO 24.7	0.000	0.000	0.000	.065	.194	.839	2.324	4.519	3.551	2.582	1.872	.646	.258	0.000	0.000	0.000	16.850
24.7 TO 25.1	0.000	0.000	0.000	0.000	0.000	.323	.646	1.356	2.453	2.647	2.001	1.162	.581	0.000	0.000	0.000	11.168
25.1 TO 25.6	0.000	0.000	0.000	0.000	0.000	.129	.258	.516	1.291	1.743	1.614	1.549	1.097	.194	~~.065~~	.065	~~8.522~~
25.6 TO 26.0	0.000	0.000	0.000	0.000	.065	.065	.065	.258	.452	.968	.775	1.097	.646	.258	.194	0.000	4.842
26.0 TO 26.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	.194	.387	.258	.581	.323	0.000	0.000	1.808
26.5 TO 27.0	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	0.000	0.000	.129	.194	.258	.065	.065	0.000	.775
27.0 TO 27.4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	0.000	.065	.129	0.000	.258
27.4 TO 27.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	0.000	0.000	.065
TOTAL	.194	.516	2.260	5.229	7.360	13.299	13.234	15.300	13.493	11.104	7.553	5.487	3.551	.904	.452	.065	100.0

MEASUREMENTS ARE IN INCHES

MEASUREMENT TYPE	MEAN	STANDARD DEVIATION	RANGE	HIGH	LOW	PERCENTILE LEVELS 1	5	50	95	99
STANDING HEIGHT	69.94	2.328	13.6	77.1	63.5	65.2	66.2	69.9	73.9	75.3
BUTTOCK TO KNEE LENGTH	24.09	.999	6.9	27.6	20.7	21.8	22.5	24.0	25.8	26.5

CORRELATION R = .774

Y = .867+(.332X)

X = 26.450+(1.805Y)

CORRELATION TABLE

STANDING HEIGHT AND KNEE HEIGHT

ENTRIES REPRESENT PERCENTAGES OF 1549 SUBJECTS.

STANDING HEIGHT

KNEE HEIGHT	63.0 64.0	64.0 64.9	64.9 65.8	65.8 66.7	66.7 67.6	67.6 68.5	68.5 69.4	69.4 70.3	70.3 71.2	71.2 72.1	72.1 73.0	73.0 73.9	73.9 74.9	74.9 75.8	75.8 76.7	76.7 77.6	TOTAL
18.8 TO 19.2	0.000	0.000	0.000	.065	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.129
19.2 TO 19.6	0.000	0.000	.194	.065	.258	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.516
19.6 TO 20.0	.065	.129	.516	.710	.129	.194	.065	0.000	0.000	.065	0.000	0.000	0.000	0.000	0.000	0.000	1.872
20.0 TO 20.4	.129	.129	.839	1.227	1.291	1.162	.323	.129	0.000	0.000	0.000	0.000	.065	0.000	0.000	0.000	5.294
20.4 TO 20.8	0.000	.129	.323	1.872	1.420	2.324	1.097	.645	.129	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7.941
20.8 TO 21.2	0.000	.129	.323	.710	2.260	3.680	2.324	2.001	.968	.258	0.000	0.000	0.000	0.000	0.000	0.000	12.653
21.2 TO 21.6	0.000	0.000	.065	.516	1.679	3.357	3.551	3.357	1.679	.646	.065	0.000	.065	0.000	0.000	0.000	14.977
21.6 TO 22.0	0.000	0.000	0.000	.065	.258	1.743	4.003	3.357	3.228	1.356	.452	.387	.194	0.000	0.000	0.000	15.042
22.0 TO 22.5	0.000	0.000	0.000	0.000	0.000	.516	1.485	3.615	3.744	2.711	1.808	.516	.065	0.000	0.000	0.000	14.461
22.5 TO 22.9	0.000	0.000	0.000	0.000	0.000	.258	.258	1.679	2.260	3.486	2.260	1.679	.258	0.000	0.000	0.000	12.137
22.9 TO 23.3	0.000	0.000	0.000	0.000	0.000	.065	.129	.452	1.291	1.743	1.614	1.162	.581	.194	.065	0.000	7.295
23.3 TO 23.7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.194	.581	1.033	1.291	.968	.258	.065	0.000	4.390
23.7 TO 24.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	.258	.258	.258	.904	.129	0.000	.065	1.937
24.1 TO 24.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	.194	.387	.258	.258	0.000	1.162
24.5 TO 24.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	.065	0.000	0.000	.129
24.9 TO 25.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	.065
TOTAL	.194	.516	2.260	5.229	7.360	13.299	13.234	15.300	13.493	11.104	7.553	5.487	3.551	.904	.452	.065	100.0

MEASUREMENTS ARE IN INCHES

MEASUREMENT TYPE	MEAN	STANDARD DEVIATION	RANGE	HIGH	LOW	PERCENTILE LEVELS 1	5	50	95	99
STANDING HEIGHT	69.94	2.328	13.6	77.1	63.5	65.2	66.2	69.9	73.9	75.3
KNEE HEIGHT	21.84	.977	6.1	25.1	19.0	19.7	20.3	21.8	23.5	24.2

CORRELATION R = .813

Y = -2.036+(.341X)

X = 27.602+(1.938Y)

CORRELATION TABLE

STANDING HEIGHT AND SITTING EYE HEIGHT

ENTRIES REPRESENT PERCENTAGES OF 1549 SUBJECTS.

STANDING HEIGHT

SITTING EYE HEIGHT	63.0 64.0	64.0 64.9	64.9 65.8	65.8 66.7	46.7 67.6	67.6 68.5	68.5 69.4	69.4 70.3	70.3 71.2	71.2 72.1	72.1 73.0	73.0 73.9	73.9 74.9	74.9 75.8	75.8 76.7	76.7 77.6	TOTAL
27.8 TO 28.3	0.000	.129	0.000	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.194
28.3 TO 28.8	0.000	.065	.323	.258	.129	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.839
28.8 TO 29.3	.129	0.000	.258	.646	.323	.258	.065	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.743
29.3 TO 29.8	0.000	.194	.387	.452	.904	.646	.516	.194	.065	.065	0.000	0.000	0.000	0.000	0.000	0.000	3.422
29.8 TO 30.3	0.000	.129	.710	1.549	1.420	1.872	1.097	1.097	.387	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.263
30.3 TO 30.8	.065	0.000	.387	1.356	2.001	3.228	2.260	1.743	.968	.775	.129	.129	0.000	0.000	0.000	0.000	13.041
30.8 TO 31.3	0.000	0.000	.129	.775	1.356	3.873	3.163	2.905	2.324	1.097	.581	.194	.065	0.000	0.000	0.000	16.462
31.3 TO 31.8	0.000	0.000	.065	.065	.710	2.195	3.099	3.809	2.582	1.872	1.162	.387	.194	0.000	0.000	0.000	16.139
31.8 TO 32.4	0.000	0.000	0.000	.065	.387	.839	2.066	3.422	3.228	2.647	1.033	.516	.258	0.000	0.000	0.000	14.461
32.4 TO 32.9	0.000	0.000	0.000	0.000	.129	.129	.775	1.679	2.447	2.647	2.001	1.485	.452	.129	0.000	0.000	12.072
32.9 TO 33.4	0.000	0.000	0.000	0.000	0.000	.129	.194	.323	.516	1.291	1.291	1.420	.710	.258	.065	0.000	6.198
33.4 TO 33.9	0.000	0.000	0.000	0.000	0.000	.065	0.000	.065	.452	.387	.904	.839	.839	.258	.129	0.000	3.938
33.9 TO 34.4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.194	.258	.323	.194	.581	.065	.129	.065	1.808
34.4 TO 34.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.129	.065	.129	.194	.387	.065	0.000	0.000	.968
34.9 TO 35.4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.129	0.000	.129	.129	0.000	.387
35.4 TO 35.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	0.000	0.000	.065
TOTAL	.194	.516	2.260	5.229	7.360	13.299	13.234	15.300	13.493	11.104	7.553	5.487	3.551	.904	.452	.065	100.0

MEASUREMENTS ARE IN INCHES

MEASUREMENT TYPE	MEAN	STANDARD DEVIATION	RANGE	HIGH	LOW	PERCENTILE LEVELS 1	5	50	95	99
STANDING HEIGHT	69.94	2.328	13.6	77.1	63.5	65.2	66.2	69.9	73.9	75.3
SITTING EYE HEIGHT	31.57	1.185	7.6	35.6	28.1	28.8	29.7	31.5	33.6	34.5

CORRELATION R = .734
Y = 5.429+(.374X)
X = 24.380+(1.443Y)

CORRELATION TABLE

SITTING SHOULDER HEIGHT AND KNEE HEIGHT

ENTRIES REPRESENT PERCENTAGES OF 1549 SUBJECTS.

SITTING SHOULDER HEIGHT

KNEE HEIGHT	19.8 20.3	20.3 20.8	20.8 21.3	21.3 21.7	21.7 22.2	22.2 22.7	22.7 23.2	23.2 23.7	23.7 24.2	24.2 24.7	24.7 25.2	25.2 25.7	25.7 26.1	26.1 26.6	26.6 27.1	27.1 27.6	TOTAL
18.8 TO 19.2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.129
19.2 TO 19.6	0.000	0.000	0.000	.129	.065	0.000	.129	.194	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.516
19.6 TO 20.0	0.000	0.000	.065	.194	.452	.194	.387	.194	.194	.129	.065	0.000	0.000	0.000	0.000	0.000	1.872
20.0 TO 20.4	0.000	0.000	.129	.258	.646	1.097	1.291	.581	.775	.194	.258	.065	0.000	0.000	0.000	0.000	5.294
20.4 TO 20.8	0.000	0.000	.065	.129	.904	1.614	1.420	1.356	1.291	.646	.194	.258	0.000	0.000	.065	0.000	7.941
20.8 TO 21.2	.065	0.000	.065	.516	.839	1.872	1.937	2.195	2.453	1.872	.646	0.000	0.000	.129	.065	0.000	12.653
21.2 TO 21.6	0.000	0.000	.194	.258	.581	2.001	2.260	2.776	3.099	1.872	1.356	.452	.065	.065	0.000	0.000	14.977
21.6 TO 22.0	0.000	0.000	0.000	.194	.775	1.033	1.872	2.776	3.034	2.582	1.743	.581	.194	.194	.065	0.000	15.042
22.0 TO 22.5	0.000	0.000	0.000	.129	.065	1.420	1.614	2.130	2.711	2.518	2.130	1.227	.452	0.000	.065	0.000	14.461
22.5 TO 22.9	0.000	0.000	0.000	.065	.065	.516	.968	1.485	2.941	2.453	1.937	.839	.839	.065	.065	0.000	12.137
22.9 TO 23.3	0.000	0.000	0.000	0.000	.065	.258	.710	.839	1.033	1.743	1.485	.387	.516	.194	0.000	.065	7.295
23.3 TO 23.7	0.000	0.000	0.000	0.000	0.000	0.000	.129	.516	1.097	.775	.904	.452	.387	.065	.065	0.000	4.390
23.7 TO 24.1	0.000	0.000	0.000	0.000	0.000	.065	.194	.065	.129	.323	.516	.194	.194	.129	.065	.065	1.937
24.1 TO 24.5	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	.065	.323	.258	.194	.129	.129	0.000	0.000	1.162
24.5 TO 24.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	.065	0.000	0.000	0.000	0.000	0.000	.129
24.9 TO 25.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	0.000	0.000	0.000	.065
TOTAL	.065	0.000	.516	1.872	4.454	10.071	12.976	15.171	18.786	15.494	11.556	4.713	2.776	.968	.452	.129	100.0

MEASUREMENTS ARE IN INCHES

MEASUREMENT TYPE	MEAN	STANDARD DEVIATION	RANGE	HIGH	LOW	PERCENTILE LEVELS 1	5	50	95	99
SITTING SHOULDER HEIGHT	23.80	1.063	7.3	27.4	20.0	21.5	22.0	23.8	25.5	26.4
KNEE HEIGHT	21.84	.977	6.1	25.1	19.0	19.7	20.3	21.8	23.5	24.2

CORRELATION R = .457
Y = 11.851+(.420X)
X = 12.942+(.497Y)

CORRELATION TABLE

SITTING SHOULDER HEIGHT AND SITTING EYE HEIGHT

ENTRIES REPRESENT PERCENTAGES OF 1549 SUBJECTS.

SITTING SHOULDER HEIGHT

SITTING EYE HEIGHT	19.8 20.3	20.3 20.8	20.8 21.3	21.3 21.7	21.7 22.2	22.2 22.7	22.7 23.2	23.2 23.7	23.7 24.2	24.2 24.7	24.7 25.2	25.2 25.7	25.7 26.1	26.1 26.6	26.6 27.1	27.1 27.6	TOTAL
27.8 TO 28.3	0.000	0.000	.129	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.194
28.3 TO 28.8	.065	0.000	.065	.323	.129	.129	.129	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.839
28.8 TO 29.3	0.000	0.000	.065	.323	.581	.516	.194	.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.743
29.3 TO 29.8	0.000	0.000	.194	.323	.968	.968	.646	.323	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.422
29.8 TO 30.3	0.000	0.000	.065	.516	1.162	2.582	2.001	1.291	.323	.323	0.000	0.000	0.000	0.000	0.000	0.000	8.263
30.3 TO 30.8	0.000	0.000	0.000	.258	1.033	3.163	3.486	2.647	2.066	.387	0.000	0.000	0.000	0.000	0.000	0.000	13.041
30.8 TO 31.3	0.000	0.000	0.000	.065	.387	1.679	3.551	3.809	4.454	1.549	.710	.258	0.000	0.000	0.000	0.000	16.462
31.3 TO 31.8	0.000	0.000	0.000	0.000	.194	.839	1.743	4.067	4.648	3.228	1.291	.129	0.000	0.000	0.000	0.000	16.139
31.8 TO 32.4	0.000	0.000	0.000	0.000	0.000	.065	.968	1.872	3.873	4.196	2.389	.904	.065	.129	0.000	0.000	14.461
32.4 TO 32.9	0.000	0.000	0.000	0.000	0.000	.129	.258	.968	2.711	3.357	3.292	.839	.387	.129	0.000	0.000	12.072
32.9 TO 33.4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.129	.516	1.291	2.389	1.162	.710	0.000	0.000	0.000	6.198
33.4 TO 33.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	.904	1.033	1.033	.710	.065	.065	.065	3.938
33.9 TO 34.4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	.258	.323	.194	.581	.129	.258	0.000	1.808
34.4 TO 34.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	0.000	.129	.194	.194	.323	.065	0.000	.968
34.9 TO 35.4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.129	.194	.065	0.000	.387
35.4 TO 35.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.065	.065
TOTAL	.065	0.000	.516	1.872	4.454	10.071	12.976	15.171	18.786	15.494	11.556	4.713	2.776	.968	.452	.129	100.0

MEASUREMENTS ARE IN INCHES

MEASUREMENT TYPE	MEAN	STANDARD DEVIATION	RANGE	HIGH	LOW	PERCENTILE LEVELS 1	5	50	95	99
SITTING SHOULDER HEIGHT	23.80	1.043	7.3	27.4	20.0	21.5	22.0	23.8	25.5	26.4
SITTING EYE HEIGHT	31.57	1.185	7.6	35.6	28.1	28.8	29.7	31.5	33.6	34.5

CORRELATION R = .789
Y = 10.650+(.879X)
X = 1.458+(.708Y)

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13. ABSTRACT

A computerized dynamic man-model is being developed as part of a contract administered by the Office of Naval Research (ONR) through the auspices of the Joint Army Navy Aircraft Instrumentation Research (JANAIR) Program Working Group. The baseline man-model to be developed in the first year of the proposed six-year program is a 23-joint articulated link "stick-man". The anthropometric, joint angular limit, mass, and visual characteristics used for the initial man-model (BOEMAN-I) are listed in this document. Present literature has been used whenever possible to provide these data. Boeing researchers have supplemented the literature information to complete that needed for BOEMAN-I. (U)

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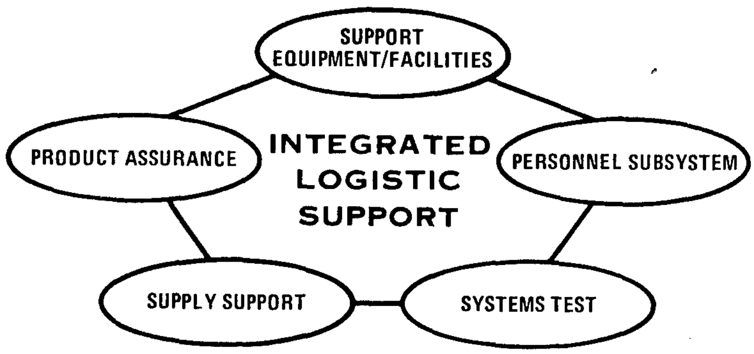
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